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Healing of surgical extraction wounds in macacus rhesus monkeys: I. The effect of burs

■ *Harold E. Simpson, M.D.S., Newcastle upon Tyne, England*

A study was undertaken to determine the nature of the healing wound in the macacus rhesus monkey when teeth were surgically removed. Burs were used for the removal of bone.

Twenty teeth were removed. The sockets were examined histologically at intervals of three days to eight weeks postoperatively. Tendencies toward necrosis of flap margins were noted. Bone fragments within the socket were associated with an inflammatory response, and bony fragments beneath the flap were not well tolerated. Wound healing progressed in a similar manner to that seen in forceps extraction, although the form of the alveolar ridge was altered by loss of bone.

The use of forceps in the extraction of teeth has great advantages over surgical technics in the duration of the operation and the amount of injury to the gingival and alveolar tissues. There are, however, numerous occasions when surgical methods are necessary and, also, the operator frequently is in some doubt as to which course to pursue.

The choice of instruments for surgical removal of teeth is generally a simple one. Only burs and chisels are commonly used and only one of these types of instruments is usually employed in a given instance. There is little obvious advantage in either, and operators vary in their preference. Most dentists, however, are more familiar with the use of burs and perhaps this is the reason for the frequent employment of burs in minor oral surgery.

The majority of recent investigators appear to have assumed that the reparative changes in tooth sockets are fairly uniform regardless of the method of extraction and have attempted to expedite healing by extraneous means rather than by modifications of technic. The subject of technic, however, has not been entirely neglected. Schram[1] (1929) compared the healing of surgical extraction wounds with that after forceps extraction

and found that although in the former healing was more rapid, more bone was lost. Balogh[2] (1932) observed acceleration of the initial stages of healing in surgical extraction wounds. Christopher[3] (1942), after studying human biopsy material, stated that although initial healing appeared to be accelerated, the high lingual crest increased the time required for final rebuilding.

Other modifications of technic have been advocated either to simplify tooth removal by inserting instruments along the root (Thew,[4] 1934, Gottlieb and Crawford,[5] 1943) or to improve healing by removing bone. Gottlieb and Crawford[5,6] (1943, 1947) advocated the removal of the alveolar crests as a means of avoiding and treating dry socket. A similar technic was described by Osterloh[7] (1945), who also removed sclerotic bone. Claflin[8] (1937), employing dogs as experimental animals, removed the alveolar crests after the extraction of teeth and reported that healing was accelerated because the suturing of the gingival margins eliminated the time otherwise necessary for epithelial proliferation over the socket.

The method of bone removal appears to have received somewhat scanty attention. Dingman and Hayward[9] (1947) stated that the choice of method was relatively unimportant so long as good surgical principles were observed. This comment is in agreement with the clinical observations of Deebach[10] (1935), who found no variations, up to the time of epithelization, resulting from the use of forceps, elevators, burs or chisels. Thompson[11] (1955) considered that in most minor oral surgical procedures, burs were superior to chisels provided that the products of the operation were washed away adequately.

■ *Experimental Method*

In order to assess the effects of surgical technics, three series of experiments were devised. In the first and second the extraction of teeth was facilitated by means of burs and chisels respectively. In the third, alveolar crests were reduced in height by means of rongeur forceps after the removal of teeth with regular forceps. In this way the effects of different instruments could be studied and a comparison made with the simple forceps extraction wounds described in a previous article.[12]

In this first series of experiments a mucoperiosteal flap was reflected on the buccal or labial aspect of the tooth to be extracted. Bone was removed with burs until the tooth could be extracted with ease. After the extraction of the tooth, the flap was replaced and sutured into position, thereby sealing the socket from the mouth. Sutures were removed after one week. Twenty teeth were extracted and 17 animals were employed. Material was obtained for examination at periods ranging from three days to eight weeks after the removal of the teeth.

■ *Results*

At three days (Fig. 1) the flap was well sutured into place but its margin was necrotic. A fibrinous exudate slightly separated the gingival margins. Many bone fragments and numerous inflammatory cells could be noted in the area of the injured bone. Some bone fragments which had fallen between the flap and that part of the alveolar bone not operated

on were exciting very little inflammatory response. The inflammatory infiltration in the upper part of the socket was very extensive but ceased fairly abruptly a short distance below the level of the cut crest. The lacunae bordering the cut surface were empty.

At one week there was a central gap in the epithelium. The organizing blood clot above the level of the alveolar crests was densely infiltrated and the production of abscess cavities appeared possible (Fig. 2). Large numbers of bone fragments extended in a column from the cut external crest to the epithelial defect. A few giant cells were attacking some of the larger bone fragments. Osteoclasts also were present on the alveolar crests.

At two weeks the epithelium usually was still ununited, and when a complete covering of the organizing clot had occurred, it consisted of a very thin layer of epithelial cells. At the sides of the socket the new bone extended to the level of the crests, but in the center it tended to fall considerably below a line joining them, there being great variation in the volume of bone produced even in similar sockets. The number of bone fragments remaining varied greatly. These fragments either were being exfoliated or were undergoing osteoclasia. There were relatively few inflammatory cells at this stage, and they were mainly confined to the area below the epithelial defect. Osteoclasia of both crests was occurring but not very actively.

At three weeks (Fig. 3) the epithelium was united. An unevenness in its surface contour probably was due to failure of precise apposition of the epithelial margins. The bone did not yet fill the socket to the level of the crests, a central fibrous cone extending from the subepithelial connective tissue to a variable depth. Bone fragments had been completely eliminated from the three sockets examined. Osteoclasia of both crests continued.

At four weeks (Fig. 4) the bone had filled the whole socket to the level of the crests, which were now being repaired except for the external surface of the buccal crest which continued to be resorbed. Bone fragments again were visible at this stage in the subepithelial connective tissue, showing that the duration of their retention was variable. They were being surrounded by epithelium preparatory to exfoliation.

At six weeks the contour of the bone between the crests tended to be slightly convex, apparently in consequence of resorption of the crests. The tendency toward a surface condensation of the bone at this stage was clearly seen, but it had not yet advanced to the stage of forming a cortex. Bone fragments were present in the subepithelial connective tissue in one instance. They were necrotic but were not giving rise to any reaction, having been encapsulated in fibrous tissue. Osteoclasia of the external aspects of both crests tended to produce a smooth curved ridge.

At eight weeks (Fig. 5) resorption continued to smooth the contour of the ridge. The surface condensation of bone was more pronounced, but a cortical layer had not yet formed. A small amount of new bone was being laid down on the surface of those trabeculae in contact with the surface soft tissues which at this stage formed a mucoperiosteum. It was

Fig. 1—Three day old surgical extraction wound. Severe inflammatory reaction above level of cut labial crest, but below this level, socket is similar to a forceps extraction wound

Fig. 2—One week old surgical extraction wound. Many bone fragments still are present above cut labial crest. Part of blood clot has become necrotic and has been lost

evident that the contour of the edentulous alveolar ridge had been strongly influenced by the removal of the external wall of the socket. In a single-rooted tooth the surface fell in an almost straight line from the lingual crest to the stump of the labial

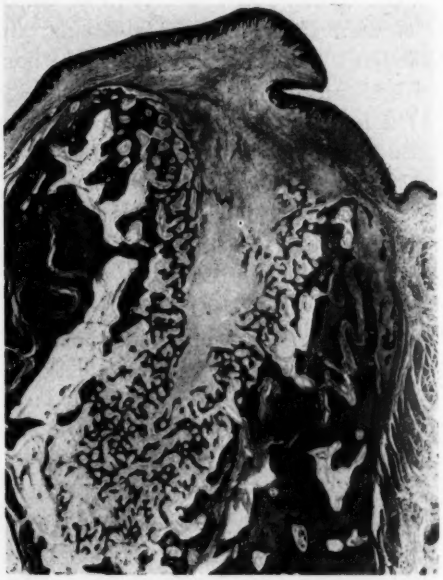

Fig. 3—Three week old surgical extraction wound. Epithelium is united. Several bone fragments which have fallen between flap and part of bone not operated on have remained vital and been incorporated into a mass of new fibrous tissue

crest. In a multirooted tooth the highest point of the ridge tended to lie near the plane of the interradicular septum.

■ *Removal of Bone Fragments*

In the foregoing experiments the bone fragments produced during the operations were removed mechanically by means of swabbing and light curetting. It is clear that these methods were in-

adequate, and in an attempt to improve on them a series of four sockets was treated by vigorous syringing with normal saline solution after the removal of the tooth. A great reduction in the number of bone fragments and a considerable diminution in the degree of inflammatory infiltration was obtained. Although this experiment was a small one, it indicated that attention to this point is of the greatest importance for the promotion of healing.

■ *Discussion*

The main advantages of surgical extraction technics are that injury to hard and soft tissues is controlled and in some instances may be reduced, and that the falling in of the flap reduces the size of the blood clot and also protects it. Krogh[13] (1937), considering the incidence of dry sockets, remarked that, in surgical extraction wounds, contraction of the clot pulled in the soft tissues and so kept the socket healed, whereas, in forceps extraction wounds, the clot sometimes shrank away from the socket. In the present experiments these advantages, although no doubt operative, in no way expedited the healing process and were offset by certain disadvantages, notably the tendency of the flaps to necrose.

The main disadvantages of surgical removal of teeth, apart from the prolonging of the operation in many instances and increased instrumentation, are that the total degree of trauma, in terms of area of tissue subjected to mechanical injury, may be greater than would have occurred with forceps extractions, an unavoidable risk but a calculated one, and that bone may be removed and not re-

Fig. 4—Four week old surgical extraction wound. Bone formation has reached a line joining the alveolar crest; this is usual limit of its extent

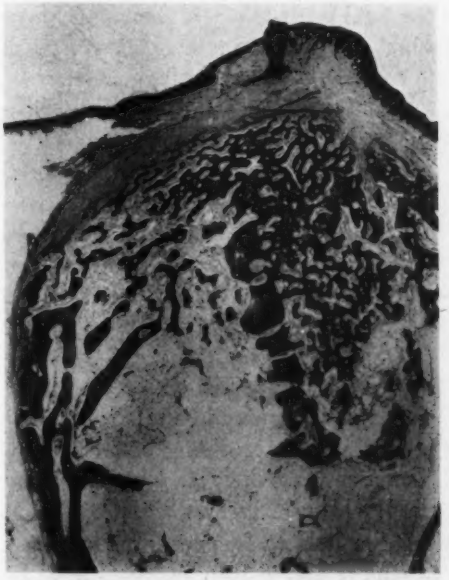

Fig. 5—Eight week old surgical extraction wound. Socket outlines are largely destroyed. In this multirooted tooth, form of ridge is modified by interradicular crest

stored later. The present experiments strongly suggest that this last possibility is the rule. The contour of the healed alveolar bone surface extended little above a line joining the intact lingual crest with the cut surface of the buccal crest. Schram[1] (1929) stated that the extent of the new bone was limited by the position of the flap. This observation is in accord with the present findings, as the position of the flap depends on the height of the crests. It was never found, however, that the bone contour was concave, as might be expected if the flap were drawn in by the contracting clot.

Christopher's[3] (1942) suggestion that the final contouring of the alveolar process might be prolonged owing to the high lingual or palatal crest could not be confirmed within the time limit of the experiments. It appeared more likely that the final contour would remain different from that in forceps extraction wounds in consequence of those high crests.

Burs, although tolerated better than chisels by the majority of conscious patients, tend to prolong the time of operation by obscuring the field with a mass of blood and bone fragments. The burs can also become overheated and may then cause burning of the bone surface. No evidence of burning was observed, but care had been taken to prevent overheating of the burs. Schram[14] (1945) remarked that burning by the improper use of burs and the crushing force of instrumentation made the retention of the blood clot less likely.

Small bone fragments are not easy to remove and in most instances must be infected. Vigorous syringing of the sockets with normal saline solution after the removal of the tooth considerably reduces the number of fragments.

Dingman and Hayward[9] (1947) considered that retention of sections of broken bone might lead to difficulty. Glickman and co-workers[15] (1947) found that bone fragments were always centers of inflammatory change. Claflin[8] (1937), on the other hand, found that bone filings between the periosteum and the surgically prepared bone of the jaw were well tolerated, and that bone filings in the clot acted as centers of ossification. In the present experiments bone fragments lying free in the blood clot or between the mucoperiosteum and the cut surface of the bone were almost invariably associated with inflammatory infiltrations which were very pronounced in the earlier stages. They were visible up to six weeks after operation. They were either resorbed by osteoclasts or exfoliated. Occasionally a bone fragment would be tolerated and become incorporated in the new bone. Bone fragments between flaps and those parts of the alveolar plates not involved in the operation were rather well tolerated, especially if they were remote from the wound surface. Some of these fragments had been torn away during the reflection of the flaps and retained their connection with the soft tissues but others were fragments which had fallen to the base of the flaps during burring. Presumably the small amount of infection involved in these instances could be overcome and there was no possibility of further bacteria gaining access.

■ *Summary*

Twenty teeth of macacus rhesus monkeys were removed surgically with

the aid of burs, and the sockets were examined histologically at intervals of three days to eight weeks after extraction.

There was a noticeable tendency toward necrosis of the margins of the flaps. Epithelization required between two and three weeks compared with between one and two weeks in forceps extraction wounds.

Bone fragments produced by burring and lying in the upper part of the socket were usually associated with pronounced inflammatory infiltrations during the first few days. Their continued expulsion from the socket delayed the formation of a strong epithelial covering.

Bone fragments between flaps and regions of alveolar bone not operated on were well tolerated.

Bone formation in the socket was limited by a line joining the lingual crest and the reduced labial crest.

A stable bone condition was being approached at the end of eight weeks.

■ *Conclusions*

Wounds produced by the surgical removal of teeth heal in a manner similar to that observed in forceps extraction wounds. The form of the alveolar ridge is altered by the removal of bone during the operation. This bone is not replaced during the repair process and, as in forceps wounds, bone formation in the socket is generally limited by a line joining the alveolar crests, the labial crest in the present experiment being much reduced in height.

The numerous fragments of bone produced by burring are associated with considerable inflammatory infiltration and are therefore probably responsible for the delay in epithelization of these wounds. Noticeable reduction of the inflammatory infiltration is obtained if the bone fragments are removed by syringing with saline solution.

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Complications in local anesthesia: prevention and treatment

■ *J. R. Hayward,* D.D.S., M.S., Ann Arbor, Mich.*

Local anesthetics are used daily in the practice of dentistry. They are extremely safe; however, their use is not without hazard. Not only regional complications such as pain, infection and needle breakage can be seen, but also systemic complications, which may be life endangering, can occur. It behooves the operator to know what complications may arise and to be able to diagnose and treat them adequately. The serious regional and systemic complications are described as well as specific therapeutic measures. A table of drugs for emergency use is presented which outlines the drug, route of administration, dosage and indication.

The nearly universal employment of local anesthetics in the daily practice of dentistry is indicative of their benefits and safety. Many of the advances in modern dentistry have been achieved through these agents. They provide for the ambulatory patient painless dentistry with resultant patient cooperation, and minimal disturbances to metabolism, vital signs and defense reflexes. Their use requires minimal equipment, and there is no need for auxiliary personnel to administer the anesthetic.

A wide variety of psychotherapeutic preanesthetic drugs and a broad range of effective local anesthetic agents which vary in duration are now available. The dentist is able to select the premedication, local anesthetic agent and technic best suited to the particular patient and the specific treatment requirements. However, dentists recognize their responsibilities in further improvement in the use of these agents. All anesthetic agents are toxins, and injection procedure entails technical hazards. Therefore, dentists should look for ways to prevent, recognize promptly and treat adequately the regional and systemic complications in the administration of local anesthetic agents.

■ *Regional Complications*

Skilled technic is the *sine qua non* in local anesthesia. The unpleasant regional complications in injections of local anesthetic agents may be prevented by careful attention to refinements in technic.

PAIN – Reducing the psychological barriers to local anesthetic injection is a necessary art in dental practice. The full use of rapport, suggestion, assurance, premedication and efficient technics will con-

tribute to successful routines. Topical anesthetics on mucous membranes are limited in depth of effective penetration. They bring some distracting benefit of subjective paresthesia and are helpful to some operators. Toxicity from absorption of topical anesthetic agents has been found to exceed the effect of infiltration administration.[1] This factor must be considered in the employment of potent topical anesthetics.

Tissue distortion is minimized by a slow rate of injection. In most instances delayed pain after injections is due to hydraulic stripping of periosteum and similar tissue distention. This type of damage in the pterygoid muscle region may produce transient trismus. Accurate technics that compensate for anatomic variables will guide effective injections to the perineural target areas.

Sharp needles and a slow rate of injection will reduce most painful stimuli.

INFECTION — Autoclave sterilization and protective storage of injection equipment bring needed safety to the dental office. Modern autoclaves and storage covers have simplified this requirement.[2]

If it is remembered that pathogenic organisms can be introduced to deep tissues along the needle tract,[3] there will be no neglect of field preparation before injection. Firm pressure with a gauze sponge to dry the mucosa is probably the most important step. Antiseptic agents on this dry and isolated field then will be effective.

NEEDLE BREAKAGE — The development of improved needle manufacture and the recent introduction of disposable needles will reduce further the rare incidence of needle breakage. A few technical precautions should be kept in mind. Sudden movement of the patient and lack of alertness on the part of the operator usually are involved when a needle is broken. Since the hub area is the common site, the needle fragment may be visible and retrieved with a locking hemostat. The need for surgical exploration is not an emergency. Removal should be planned by an experienced operator after adequate roentgenographic localization and under ideal conditions.

VASCULAR COMPLICATIONS—Although intravascular injection is a local complication, the effects are significant in the systemic aspects of reactions. When the needle point is in the perineural target area for solution deposit in deep block injections, the safety of preliminary aspiration has been emphasized in all recent teaching on the subject.[4]

■ *Systemic Complications*

Reviews by Seldin,[5] Criep,[6] Mayer,[7] and others indicate that death due to local anesthetic injection is a possibility in less than one in several million administrations. The relatively small volume and relatively low concentration of solutions used for dental anesthesia are basic safety factors. The additional safety of aspiration before injection for deep block anesthesia has been recognized by the profession. The possibility of intravascular injection was determined by Harris[8] as 3.2 per cent. The toxicity increase demonstrated through experimental intravenous administration signifies that such accidental administration is responsible for toxic re-

actions in normal individuals. Since it is necessary to have sufficient lumen size for demonstration blood with negative pressure, a 25 gauge needle for deep blocks is again recommended. This also is the minimum gauge needle for tactile sensation and direction control for injection for deep block anesthesia.

The unusual condition of hypersensitivity reaction may be revealed only by the patient's history. Since the repeated exposure to the antigen agent will bring more severe reaction, even to the extent of lethal anaphylactic shock, any clue of previous sensitization reaction demands respect. The rarity of allergic response to local anesthesia does not detract from its significance. Intradermal skin testing is not considered reliable. A test of minimal application to nasal or oral mucous membranes has been suggested.

The untoward systemic reactions may range from simple psychogenic syncope to lethal toxic and anaphylactic states. A definite plan of procedure for prevention, prompt recognition of signs, and rational resuscitation methods should be available as a matter of routine precaution in the dental office. Emergencies require clear analysis and deliberate procedure. The following outline may serve to review important points.

■ *Emergencies During Dental Treatment*

Emergencies during the course of dental treatment may occur from a reaction induced by dental treatment agents and procedures, or from a reaction due to systemic disease processes and associated medication.

Most acute and potentially lethal disturbances can be prevented during elective dental treatment. Full utilization of all data concerning the patient's total health history and medical findings may indicate a need for caution and consultation in order to avoid a critical untoward reaction.

Constant awareness of the patient's status throughout dental procedures may intercept unusual reactions by early signs and symptoms. Prompt recognition and active management will control many emergencies before irreversible deterioration of vital processes has developed.

The opportunity to save a life may be measured only in seconds. Therefore, adequate preparation such as the following is essential:

1. Knowledge of general resuscitation principles.
2. Equipment for specific resuscitation measures.
3. Trained assistants for efficient procedures.
4. Knowledge of most available medical consultants.

General resuscitation is designed to support respiration and circulation in order to supply oxygen to the vital centers of the brain. The following measures are available:

1. Trendelenburg's position.
2. Clearance of the airway and support of respiration with oxygen.
3. In the presence of significant alteration in vital signs, preparation of intravenous route for possible use in specific treatment.

Equipment for use in emergencies includes:

1. Source of suction.
2. Airway.

Table
Drugs for emergency use

Agent	Route of administration	Dosage	Indication
Aromatic spirits of ammonia	Inhalation	Crush ampule	Syncope
Normal saline solution 250 cc. bottle	Intravenous	Establish slow drip	Maintain intravenous route
Pentobarbital sodium 50 mg./cc. 20 cc. vial	Intravenous	75 to 150 mg. slowly (1.5 to 3 cc.)	Control convulsions and produce hypnotic depression
Phenylephrine 10 mg./cc. 1 cc. ampule	Intramuscular or slow intravenous	0.5 cc.	Combat hypotension
Mephentermine sulfate 7.5 mg./cc. 2 cc. ampules	Intramuscular or slow intravenous	15 mg.	Combat prolonged hypotension without hemorrhage
Hydrocortisone 100 mg. vials + 2 cc. vials of sterile water	Intravenous slowly over 1 to 2 minutes	100 mg.	Severe shock states
Glyceryl trinitrate 0.4 mg. tablets	Sublingual	1 to 2 tablets	Attack of angina pectoris
50% glucose 50 cc. vial	Intravenous	10 cc.	Insulin shock
Nikethamide 1.5 cc. ampule	Intramuscular or intravenous	1 to 3 cc.	Analeptic stimulation
Meperidine 2 cc. ampule 100 mg.	Intramuscular	2 cc.	Extreme pain
Diphenhydramine 10 mg./cc. 10 cc. vial	Intramuscular slow intravenous	10 to 30 mg.	Antihistamine effect in allergy

3. Oxygen equipment for artificial respiration.

4. Thirteen gauge needle.

5. Sphygmomanometer and stethoscope.

6. Tourniquet and alcohol sponges.

7. Sterile syringes (two 2 cc. and two 5 cc. with 1½ inch 20 and 22 gauge needles).

8. Adhesive tape to secure intravenous injection.

Drugs which the operator will find useful in emergencies are shown in the table.

■ *Reactions Primarily Associated with Dental Treatment*

SYNCOPE—The psychomotor response of fainting is defined as a transient form of neurogenic shock produced by cerebral ischemia. However, the signs and symptoms of syncope may be present in the initial stages of more serious reactions. Therefore, patients who fail to regain consciousness immediately demand close observation of pulse, blood pressure and respirations. Disturbances in these vital signs require that prompt supportive measures be instituted.

The causes of fainting are:

1. Psychic factors such as apprehension, anxiety and emotional disturbance. These may be associated with unpleasant stimuli, pain, sight of blood, instruments and so forth.

2. Postural aspects of sitting position which promote cerebral ischemia in early stages of hypotensive response.

Signs of syncope are (1) skin pallor and cold, moist skin; (2) weak, thready pulse; (3) nausea; (4) loss of consciousness with eyes rolled up, and (5) possible brief, mild convulsion.

In treatment, the following measures are taken:

1. The patient is placed in a supine position with head lowered (Trendelenburg's position) and with clear airway.

2. Aromatic spirits of ammonia are given to accomplish reflex respiratory stimulation.

3. The collar and neck wear are loosened.

4. A cold towel is applied to the upper part of the face.

5. The legs are elevated.

6. Oxygen is administered.

LOCAL ANESTHETIC REACTIONS—Although true reactions to local anesthetic agents are rare, their significance demands the following precautions:

1. Knowledge of the history of the patient's previous experience with local anesthetic drugs.

2. Knowledge of the exact identity and pharmacological actions of the agents which are employed.

3. Use of minimum volumes of agents with appropriate vasoconstrictor content.

4. Aspiration in order to avoid intravascular injection, and slow administration of the local anesthetic agent.

5. Where work may be divided in anatomic units, anesthetization of single areas for treatment.

The causes of local anesthetic reactions are (1) rapid absorption from inadvertent intravascular injection, and (2) previous sensitization to the anesthetic agent.

TOXIC REACTIONS TO LOCAL ANESTHETICS—The signs of toxic reaction are the following:

1. Initial transient central nervous system stimulation response – talkativeness, restlessness, tremor (this phase is absent with lidocaine[9]).

2. Depression of the central nervous system—unconscious stupor, irregular inefficient respiration and circulation with hypotension, cyanosis, and terminal failure with convulsions due to cerebral anoxia.

Treatment consists of the following measures:

1. Support of respiration with oxygen through a patent airway.

2. Venipuncture to establish intravenous route.

3. Combating of hypotension with a pressor agent, and of convulsions with a rapid-acting barbiturate.

VASOPRESSOR REACTION—The causes of vasopressor reaction are rapid absorption and magnified idiosyncrasy response to epinephrine.

For prevention, the operator should avoid intravascular and rapid injection, and should not use vasoconstrictor con-

centration of greater than 1:100,000 epinephrine or its equivalent.

The signs of vasopressor reaction are pallor, tachycardia, palpitation, headache, hypertension and rapid, labored respirations.

For treatment, the following measures are advocated:

1. Support of respiration with oxygen.
2. Administration of small (25 to 50 mg.) doses of short-acting barbiturate.
3. Rarely, administration of vasodilator and adrenolytic drugs.

ALLERGIC REACTION—Allergic reactions are caused by sensitization. Such reactions can be prevented by obtaining a detailed history with special attention given to drugs to which the patient is sensitized. Special precautions are in order when patients have asthmatic and general allergic tendencies.

The signs of mild reactions are (1) urticaria—wheals and rash, and (2) angioneurotic edema.

The sign of an anaphylactoid reaction is a sudden shock state with asthmatic respiration, bronchospasm and circulatory failure.

Treatment of the mild form of reaction involves symptomatic treatment with antihistamines, and warning to the patient regarding the significance of the reaction.

The treatment of the severe form includes:

1. General immediate supportive resuscitation measures.
2. Epinephrine 1:1,000 (0.2 to 0.5 cc. subcutaneously injected).
3. Intravenous administration of hydrocortisone, 100 mg. slowly.

RESPIRATORY STIMULATION — The causes of respiratory stimulation are hysteria and gross apprehension. The signs are as follows:

1. Hyperventilation with rapid, deep breathing.
2. Sensations of numbness and immobility of extremities.
3. Carpopedal tonic spasm—tetany of respiratory alkalosis.
4. Apnea without cyanosis.
5. Loss of consciousness.
6. Cycle of hyperpnea and repetition of the second through the fifth phenomena just listed.

The treatment consists of (1) rebreathing, and (2) barbiturate sedation.

RESPIRATORY DEPRESSION — The causes of respiratory depression are drug depression of hypnotics and analgesics (for example, barbiturates and narcotics). The indicative sign of respiratory depression is slow, shallow, inefficient respiration.

Treatment consists of (1) supportive measures for respiration with forced oxygen, and (2) cautious administration of analeptics.

■ *Summary*

An attempt has been made to enumerate the common and rare complications in local anesthesia. It is fortunate that severe and potentially lethal complications are uncommon. However infrequent, the serious reaction demands preparedness. Emphasis has been placed on knowledge and skill to detect serious adverse reactions promptly and institute rational resuscitation measures. — 2784 *Kenilworth Drive.*

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Mepivacaine HCl (Carbocaine): a preliminary clinical study

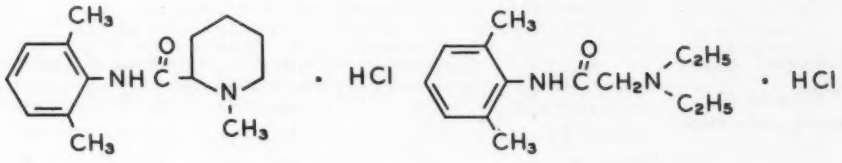
■ *Francis Lock,* D.D.S.; Daniel Vernino,* D.D.S., and M. Sadove,† M.D., Chicago*

Mepivacaine HCl was compared with lidocaine HCl in a controlled clinical trial without the addition of vasoconstrictors. In addition to more rapid onset, it appears to give a more profound level of anesthesia. An important consideration is that the duration and the more profound level of anesthesia with mepivacaine HCl without a vasoconstrictor are adequate for extensive oral surgery procedures.

Mepivacaine HCl, d,l-N methylpipecolic acid 2,6-dimethylanilide hydrochloride, a local anesthetic agent, was discovered by a group of research workers in Sweden[1] and was described by Ekenstam, Egnér and Petterson[2] in 1957. Early investigations had established that the local analgesic activity of this type of compound was increased if the carbon atoms linking the two cyclic systems were kept to the minimum. It is for this reason that mepivacaine HCl, an amide rather than an ester, has a chemical structure in which the acid group of N-methylatedpiperdine carboxylic acid is combined directly with the aromatic amine group of the aniline[1] (see illustration).

It is a white crystalline odorless powder having a salty, bitter taste. The hydrochloride salt is very resistant to alkaline and acid hydrolysis and is readily soluble in water. Mepivacaine HCl is chemically stable in solution[3] and can be boiled repeatedly or autoclaved without decomposition.

Pharmacological studies performed on experimental animals in Europe indicate that mepivacaine HCl has great anesthetic activity,[3-6] a highly favorable therapeutic index[3-7] and a low level of tissue



Mepivacaine HCl (Carbocaine) Lidocaine (Xylocaine)

irritation.[3,7-9] Clinical investigations in the department of anesthesiology at the Research and Educational Hospitals of the University of Illinois had corroborated these findings in a general way and it was felt that further studies were indicated.

European investigators have indicated the clinical promise of this new local anesthetic agent in dentistry,[10,11] and this preliminary study was performed to evaluate their findings. This clinical study compared mepivacaine HCl to lidocaine HCl which is generally considered a standard local anesthetic agent in the practice of dentistry because of its highly favorable local anesthetic properties.

■ *Methods and Technics*

In a double blind study of 200 patients chosen at random, various oral surgical procedures were performed under local anesthesia using either mepivacaine HCl or lidocaine HCl. The solutions employed in this study were of a 2 per cent concentration without the addition of a vasoconstrictor. To eliminate unconscious bias, the solutions were coded daily by a clinical nurse and the investigators were not aware of the code. Two of the investigators performed all of the injections on the patients, thereby minimizing variations in technic. The amount of anesthetic solution injected ranged from 1.5 to 3 cc., depending on the clinical requirements. For comparative purposes, equal amounts of both anesthetic solutions were used for similar procedures, and time of injection and injection technic were standardized insofar as possible. Types of surgery performed in this study included single uncomplicated extractions, surgical removal of teeth, multiple extractions, impactions, alveoloplasties, cyst enucleations, and soft tissue procedures (Table 1). The recorded data included: type of procedure, total time of onset, characteristics, adequacy, and duration of anesthesia.

■ *Results*

Total time of onset as recorded in this study is the interval of time from the beginning of the injection until the operator could initiate the procedure successfully (Table 2). In block anesthesia with mepivacaine HCl, the average time of onset was two minutes, whereas with lidocaine HCl the average time of onset was three minutes. With mepivacaine HCl infiltration anesthesia the average time of onset was 1.5 minutes, whereas with lidocaine HCl it was 2.8 minutes.

Patients who received mepivacaine for block anesthesia had a longer duration of anesthesia; in 66 per cent (43) of the patients, the anesthesia lasted for an hour or more whereas only 18 per cent (6) of

Table 1

Type of procedure performed

	Block		Infiltration	
	Mepivacaine	Lidocaine	Mepivacaine	Lidocaine
Single extractions	22	16	29	21
Multiple extractions	30	14	25	16
Impactions	10	3	1	0
Others	5	4	15	7
	67	37	70	44

the patients injected with lidocaine HCl had anesthesia for this length of time (Table 3). This longer duration was also observed when mepivacaine HCl was used for infiltration anesthesia. In 57 per cent (40) of the patients anesthesia persisted for more than one hour, whereas this occurred in only 7.5 per cent (3) of the patients injected with lidocaine HCl. One hour was chosen as arbitrary time for comparison because most dental office procedures usually do not exceed this time. Also, patients used in this study could not remain for a longer period.

The duration of anesthesia was checked by pinprick at the end of 30 minutes and 1 hour. This may not reflect actual operating time; however, it does give an indication of the clinical duration potentialities of each drug under these study conditions.

Adequate anesthesia was determined by subjective symptoms and the ability to perform the procedure without undue discomfort to the patient (Table 4). In 97 per cent (62) of the patients, adequate anesthesia was obtained with a mepivacaine block as compared with 55 per cent (20) of the patients who received lidocaine HCl. In infiltration anesthesia with mepivacaine HCl, adequacy was obtained in 91 per cent (55) of the patients, whereas 55 per cent (22) of the patients injected with lidocaine HCl had adequate anesthesia. As surprising as these data appear, they are in essential agreement with the findings of Mumford and Gray.[10] Under similar study conditions, these authors report 82.2 per cent effectiveness obtained with mepivacaine HCl anesthesia, and 48.3 per cent successful anesthesia obtained with lidocaine HCl.

The characteristic symptoms of anesthetic onset such as tingling and fullness were present in approximately the same proportion in both groups after the injec-

Table 2

Total time of onset

	Block		Infiltration	
	Mepivacaine	Lidocaine	Mepivacaine	Lidocaine
1 minute	34	5	41	6
2 minutes	13	10	13	8
3 minutes	13	15	3	21
>5 minutes	4	6	3	5
	64	36	60	40

Table 3
Duration of anesthesia

	Block		Infiltration	
	Mepivacaine	Lidocaine	Mepivacaine	Lidocaine
<30 minutes	0	13	4	17
>30 minutes	22	15	16	20
>60 minutes	43	6	40	3
	65	34	60	40

Table 4
Anesthesia

	Block		Infiltration	
	Mepivacaine	Lidocaine	Mepivacaine	Lidocaine
Adequate	62	20	55	22
Inadequate	2	16	5	18
	64	36	60	40

tions (Table 5). Many patients with these symptoms had inadequate anesthesia. Five patients experienced the sensation of burning after the injection of mepivacaine HCl and nine after lidocaine HCl.

In 12 patients similar bilateral injections were given to perform comparable procedures using both local anesthetic agents. This was done to compare the effectiveness of the anesthetic agents under study in one patient so that the variation of individual pain threshold would be minimized. With mepivacaine HCl, the average time of onset was 2.9 minutes, average duration was 45 minutes to 1 hour, and the profoundness ranged from moderate to deep. The areas injected with lidocaine HCl had an average time of onset of 3.3 minutes, average duration of 20 to 45 minutes, and the profoundness of anesthesia was mainly in the poor to moderate range.

■ *Discussion*

This clinical study tends to substantiate the results of previous investigators. It must be remembered that in this study 2 per cent solutions without a vasoconstrictor were compared. The local anesthetic characteristics of mepivacaine HCl were equal to and in some respects pos-

Table 5
Associated sensations

	Block		Infiltration	
	Mepivacaine	Lidocaine	Mepivacaine	Lidocaine
Burning	3	4	2	5
Tingling	61	31	54	39
Fullness	56	30	54	36
	120	65	110	80

These results were obtained by direct questioning of the patients.

sibly superior to lidocaine HCl. The total time of onset was approximately two thirds that of lidocaine HCl, whereas duration of adequate anesthesia in the patients injected with mepivacaine HCl was considerably longer than in the patients injected with lidocaine HCl. The profoundness and duration of anesthesia with mepivacaine HCl without the addition of a vasoconstrictor were adequate to perform extensive oral surgical procedures. This may be advantageous in the practice of dentistry on patients with certain systemic conditions where the use of a vasoconstrictor or vasopressors may be deleterious.

Thyrotoxicosis, hyperirritable heart, hypertensive states, and so on, may contraindicate the use of vasopressors. Certainly, it is commonly stated that the epinephrine-type vasopressors are contraindicated. Mepivacaine HCl provides an opportunity to avoid this difficulty.

Thus far, there have been no adverse systemic reactions noted by investigators. There have been some indications that hemorrhage from the operative site was lessened when mepivacaine HCl was used as the local anesthetic agent.

The wear-off characteristics of mepivacaine HCl, as reported by the patients, revealed that the sensation of paresthesia did not linger once the process began.

Although a double blind study is designed to eliminate bias, the investigators began to notice the greater effectiveness of a certain solution. When the code was revealed, this solution was mepivacaine HCl. The rather wide differences in this study in which vasoconstrictors were not used may be less evident when both agents are combined with a vasoconstrictor.

■ *Summary*

A double blind technic was used in a study of mepivacaine HCl in 200 patients. It was found that 2 per cent mepivacaine HCl (Carbocaine) without the addition of a vasoconstrictor is an effective local anesthetic agent with rapid onset, good spreading characteristics, good depth and duration. Further studies are indicated and in progress to determine more accurately the exact perimeters of action of this apparently excellent anesthetic agent, which may be a useful adjunct to the practice of dentistry.

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Department of the Air Force or the Air Service at large.

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Intraoral and extraoral injections

■ *Harcourt M. Stebbins,* D.D.S., and Richard J. Burch,† D.D.S., Lackland Air Force Base, Texas*

Illustrated instructions are presented for performing the maxillary nerve block, infraorbital block, mandibular nerve block and mental nerve block, with the indications for each. A history, examination and appraisal of the patient's needs should precede the injection. Emergency equipment should be available. Complications from the various blocks have been confined to a transient diplopia in 5 per cent of patients receiving maxillary nerve blocks. In 8,000 instances of local anesthesia with intravenously administered premedication (mostly with a combination of secobarbital sodium, morphine sulfate and atropine sulfate), reactions not attributable to the drug occurred in only 2 per cent. When no premedication was given, the incidence of reaction was 25 per cent.

Before any injections of anesthetics are made, certain minimum equipment is required. The sterile anesthetic syringes, solutions, needles and other items necessary for the procedure to be performed should be at hand.

Certain emergency equipment should be available. A source of oxygen, mask and bag are "musts." Additional equipment for maintenance of the airway such as oropharyngeal and nasopharyngeal airways and endotracheal and tracheotomy equipment should be on hand, depending on the operator's ability to use them.

An uncluttered emergency tray should be part of the armamentarium. Naturally, syringes and needles should be on this tray. Needles of smaller than 20 gauge are of relatively little value except for infants and children. The hydrocortisone, diphenhydramine, aminophylline, soluble barbiturate and epinephrine are the minimum drug items for such a tray. To have much more than these on an emergency tray is to invite confusion during a true emergency. The tracheotomy needle, tourniquet, file and the one or two other items complete this tray. The items on the tray should be used only for emergencies. Removal of a tourniquet, for example, for use for a routine patient and then not being able to find another tourniquet quickly, is not to be allowed: the emergency tourniquet will not be available in a crisis.

An additional tray containing an infusion of 5 per cent dextrose in water with necessary equipment for administration should be available. Additions to this tray might be candy plus nitroglycerin, amyl nitrite, penicillinase, and other drugs with which the operator is familiar and in which he has confidence.

■ *Premedication*

Intravenous administration of premedicating agents has been widely used at Lackland Air Force Base, Texas, in preparation for local anesthetic injections. Since May 1956 approximately 8,000 intravenous administrations of premedicating agents have been performed and the results have been most gratifying. In 6,800 instances a combination of secobarbital sodium, morphine sulfate and atropine sulfate was used; in 1,200 instances other combinations were used. Without premedication, reactions associated with anesthesia (but not necessarily due to the anesthetic agent itself) consisted mainly of fear reactions with various manifestations: apprehension, fainting, convulsive seizures, sweating, aphonia, urination, defecation, nausea, vomiting, complete loss of self control and refusal of treatment.

The doctors have found that it is often impossible to judge who "needs" the premedication, who is "nervous," and who is "the good patient." Even the "good" patients are apprehensive.

The intravenous route has been selected for its rapidity and predictability of action and considerably faster elimination. Intramuscular administration is acceptable in almost all instances. Other routes are slower and can be highly unpredictable.

Oral administration, under most circumstances whether fear is a factor or not, is especially unpredictable and slow. Fear stops peristalsis; the bolus of food and pH of the contents alter absorption to such an extent that the medication often takes effect after the patient's appointment. Studies in which premedicating agents routinely are given orally "20 minutes prior to the appointment" will show disappointment, discrepancies of results and reactions not attributable to the drug. When the agent is administered orally (either premedicating agent or placebo), it is the lack of absorption or delay in absorption that gives bizarre results. Suggestion plays a part also in these instances.

In the 8,000 instances of local anesthesia with intravenously administered premedication, reactions not attributable to the drug occurred in only 2 per cent. When no premedication has been given, the incidence of reaction was 25 per cent. Variation from previously reported data[1] of some 4,800 cases is the result of greater student participation.

■ *Injection Procedures*

It is understood that a history, examination and appraisal of the patients' needs precede the injections. In this paper, whenever "anesthetic solution" is mentioned, 2 per cent lidocaine with epinephrine 1:50,000 is the solution used. This paper is largely confined to nerve block injections.

■ *Maxillary Nerve Block*

A most useful injection in dental practice is the maxillary injection for blocking the second, or maxillary, division of the fifth cranial nerve. It is used in the following instances:

1. The extraction of abscessed teeth with or without incision and drainage and in those instances in which it is not desirable to inject into pathologically involved regions.
2. Extensive surgical intervention and exodontia in one half of the maxilla.
3. Antral procedures; endodontic procedures.

Fig. 1—Diagram showing frequent location of greater palatine foramen in maxillary molar region

4. Differentiation between neuralgias and in relief of pain of maxillary nerve origin.

APPROACH THROUGH GREATER PALATINE FORAMEN—There are three excellent approaches to the maxillary nerve block, two of which are intraoral. The first of these approaches to be discussed is made through the greater palatine foramen. The location varies anteroposteriorly from between the first and second molars to between the second and third molars. On occasions, it can be slightly anterior or posterior to these points. Clinical observations that facilitate finding the foramen have been evolved. Laterally the foramen is located at the junction of the horizontal plate of the palatine bone and the alveolar process (Fig. 1).

How far superiorly to insert the needle is not the same for all patients. The measurements evolved so accurately by Jorgensen[2] have been relied on. They consist of measuring (we use a Boley gauge) the distance from the infraorbital margin to the gingival margin of the maxillary second bicuspid on the same side that the injection is to be made (Fig. 2). The area just superior to the infraorbital foramen is used, and the cementoenamel junction of the tooth is determined, particularly in instances of hypertrophy. Three millimeters is subtracted and the remainder is used as the needle distance.

The procedure for maxillary nerve block through the greater palatine foramen consists of the following:

1. The distance from the infraorbital margin to the gingival margin of the second bicuspid is measured.

2. Three millimeters is subtracted from this measurement, and the remainder is used as the needle distance.

3. The foramen is entered to this needle marker and 2 to 3 cc. of solution is injected. Maximum anesthesia is obtained in 5 to 15 minutes. Skin anesthesia is obtained as depicted in Figure 3.

In many block injections anesthesia will be adequate for a particular purpose

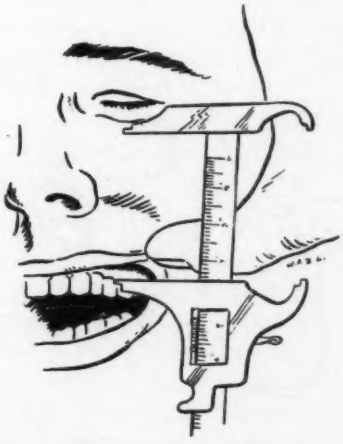

Fig. 2—Measurements with Boley gauge to determine needle distance for second division block

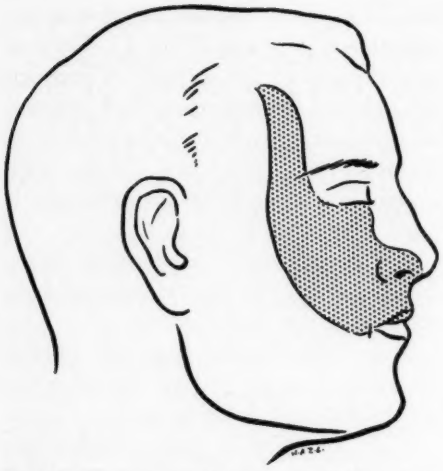

Fig. 3—Skin area anesthetized with block of second division of fifth cranial nerve

even though maximum results are not awaited. For example, a maxillary nerve block injection for a second or third molar will provide adequate anesthesia prior to obtaining anesthesia to bicuspids or central incisors.

In over 2,000 routine cases, a transient diplopia was the only reaction seen.

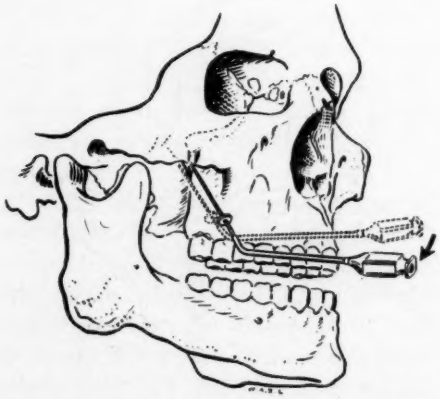

Fig. 4—Diagram showing intraoral buccal approach to second division block

INTRAORAL BUCCAL APPROACH—The buccal approach to the maxillary injection is begun at the mucobuccal fold just posterior to the second molar (Fig. 4). This route is very valuable when an infection has gone through the palatal route rather than the buccal route. The needle is advanced superiorly, medially and posteriorly. Jorgensen's quite exact measurements have been utilized. Two cubic centimeters of solution is deposited. Maximum anesthesia is obtained in 5 to 15 minutes. A block of the second division of the fifth nerve will provide skin anesthesia as depicted in the Figure 3.

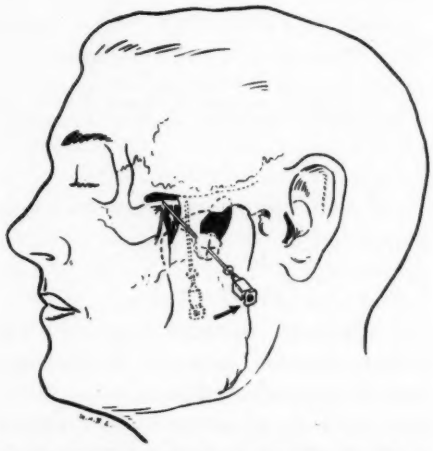

Fig. 5—Diagram showing extraoral approach to block of second division

EXTRAORAL APPROACH—For the extraoral injection for a block of the maxillary nerve division of the fifth cranial nerve (Fig. 5),

1. The mandibular notch is located with the patient in a comfortable position for the operator.

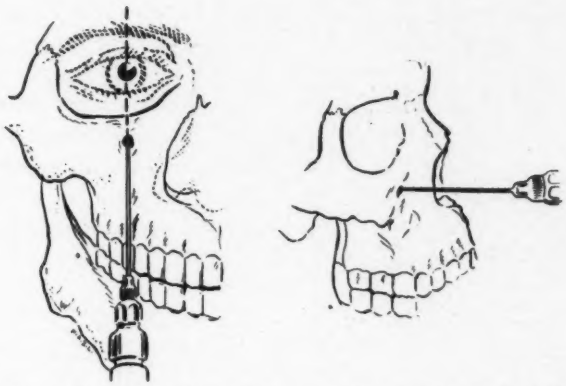

Fig. 6—Intraoral and extraoral approaches to infraorbital block

2. A skin wheal is raised in the midline of the notch and slightly anterior to its center.

3. A 3 inch needle is advanced with a 30 degree anterior angulation and a 5 degree superior angulation.

4. After the needle strikes the great wing of the sphenoid bone, the operator notes the depth—it will be 1½ to 2 inches deep—and redirects the needle a few degrees anteriorly and inserts it ¼ inch more. Patients will often complain of an electrical shock.

5. Three cubic centimeters of solution is deposited slowly.

6. Anesthesia ensues in 5 to 15 minutes over the area shown in Figure 3.

■ *Infraorbital Block*

The infraorbital block is used when it is desirable to:

1. Bypass lacerations, infections or other pathologic conditions.

2. Strengthen or complete anesthesia of a block of the second division of the fifth nerve which is not totally adequate.

3. Perform operations involving central or lateral incisors when it is necessary to obtain profound anesthesia of adjacent structures.

4. Differentiate trigger areas and to relieve neuralgia or pain.

No complications have been noted in some 1,400 instances.

One of the two following approaches to the infraorbital block is used (Fig. 6).

INTRAORAL APPROACH—The intraoral method is advocated by many and is performed as follows:

1. The infraorbital foramen is palpated extraorally on the desired side and a finger is left in place there.

2. The lip is raised.

3. The needle is inserted in the mucobuccal fold overlying the second maxillary bicuspid in a line parallel with the second bicuspid; the needle is advanced, keeping close to bone, until an obstruction (usually the foramen rim) stops its gentle progress. (Many times patients will complain at this point of a "shock" or pain in the "front teeth.")

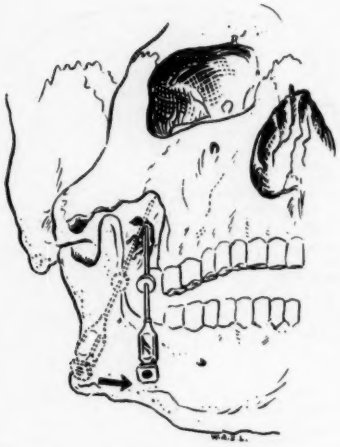

Fig. 7—Diagram showing intraoral approach to block of third division

4. About 0.5 to 1.0 cc. of anesthetic is deposited. Usually within two minutes profound anesthesia of all anterior teeth involved is accomplished; the area of anesthesia includes the bicuspids and infrequently the molars on the affected side.

Depending on the procedure to be performed, nasopalatine anesthesia is necessary, and occasionally anesthesia of the anterior palatine nerve of the side in question.

EXTRAORAL APPROACH—The extraoral approach is quite simple. These are the steps to follow:

1. The infraorbital foramen is located.

2. The skin over the region is prepared.

3. The needle is inserted posteriorly at a 90 degree angle to the skin and slightly medially.

4. A 23 gauge ¾ inch needle is used to make the injection and block with 0.5 to 1.0 cc. solution. Anesthesia is profound in about two minutes.

■ *Mandibular Nerve Block*

A block of the third, or mandibular, division of the fifth cranial nerve is used:

1. In surgical interventions involving the mandible and lower lip. It is particularly valuable when lacerations, infections or other pathologic conditions are in the regions of inferior alveolar, lingual or long buccal injection.

2. For the relief of pain of the temporomandibular joint and of masseteric or other spasms of the masticator muscles.

3. For aid in differentiating between trigeminal neuralgia and glossopharyngeal neuralgia.

INTRAORAL APPROACH—The intraoral approach can be accomplished with a 3 inch needle in the following way (Fig. 7):

1. Insertion is made in the mucosa above the maxillary second molar; the needle is facing posteriorly.

2. A course having an angulation of approximately 45 degrees superiorly and about 10 degrees medially is followed.

3. When the great wing of the sphenoid bone is contacted, the needle is then withdrawn slightly.

4. The needle then is redirected, changing the 45 degree angulation of the point downward, and is inserted about ¼ inch (5 mm.) more than when the sphenoidal wing was reached. Patients will often complain of paresthesia.

5. After aspiration, about 3 cc. of solution is deposited. Anesthesia is complete in some five to ten minutes.

Skin areas anesthetized will include

part of the ear, scalp and face as the shaded areas of Figure 8 denote. Relaxation of the muscles of mastication, of course, is also obtained.

EXTRAORAL APPROACH—The extraoral approach consists of the following steps (Fig. 9):

1. The mandibular notch is located. The center of this depression is to be the point of entry.

2. A skin wheal is raised at this point.

3. Insertion of a 3 inch needle is begun through the wheal. The needle point is directed medially and slightly anteriorly.

4. The lateral surface of the great wing of the sphenoid bone will be encountered after the needle has penetrated 1½ inches. The marker is set for ¼ inch additional depth.

5. The needle is withdrawn somewhat; the point is redirected about 10 degrees posteriorly and inserted the additional ¼ inch.

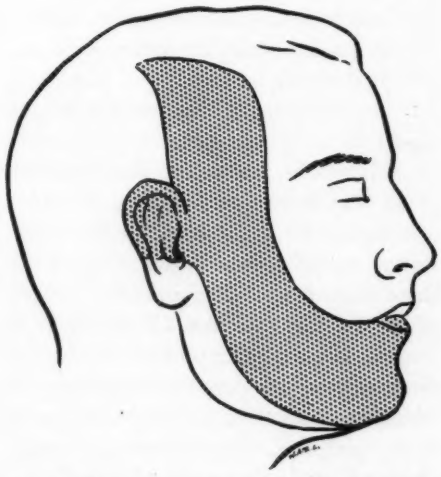

Fig. 8—Skin area anesthetized by block of third division of fifth cranial nerve

Fig. 9—Extraoral approach to third division block

6. At this point paresthesia is likely to be elicited. Three cubic centimeters of solution is deposited.

Anesthesia is complete in five to ten minutes.

■ *Mental Nerve Block*

The mental nerve block is useful in many instances, such as the following:

1. When certain regions of the lower lip should be bypassed; for example, lacerations that require suturing, lip shave and biopsy sites.

2. When it is not desired to perform an inferior alveolar nerve block and adequate anesthesia can be obtained for the treatment involved.

3. In aiding in diagnosis of tooth involvement.

4. In determination of involvements in neuralgia of the mandibular division of the fifth cranial nerve.

The structures anesthetized are the

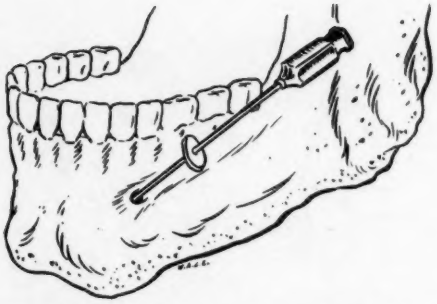

Fig. 10—Extraoral approach to mental nerve block

mandible anterior to the second bicuspid, the bicuspids and anterior teeth on affected side, mucosa, skin and lip to midline on the affected side.

INTRAORAL BLOCK OF MENTAL NERVE—The mental foramen is easily palpable in most patients. In edentulous patients it lies almost on the ridge; in patients with teeth it lies somewhere between the bicuspids about midway between the upper and lower borders of the mandible. The intraoral block can be performed as follows:

1. The mental foramen is palpated extraorally and an index finger placed and left at the site. (Pressure of the finger on the proper area is more acutely felt by the patient than equivalent pressure elsewhere on the mandible.)

2. The lip is retracted, an angled needle is inserted usually just posterior to the mandibular bicuspids, slanting toward the site under the index finger. Patients often will tell the operator when the needle has arrived. With this angulation, needles often penetrate the foramen.

3. The amount of anesthetic solution deposited ranges from 0.5 to 1.0 cc. Anesthesia ensues within five minutes.

EXTRAORAL BLOCK OF MENTAL NERVE—The extraoral block of the mental nerve can be performed in this manner (Fig. 10):

1. The mental foramen is palpated in the bicuspid region.

2. The injection is begun just posterior to the palpated site.

3. The needle is directed (1) inferiorly about 45 degrees; (2) slightly medially, and (3) anteriorly about 45 degrees.

4. Penetration of the foramen is often made. The anesthetic is injected slowly; less than 1 cc. is deposited.

5. Anesthesia ensues within five minutes.

■ *Other Injections*

A "high" inferior alveolar injection for manipulative pain persisting in the third molar regions has been used successfully. Other injections made are:

1. Infiltrative injection in close proximity to the mandible buccally and directed from superior border to inferior border at the bicuspids and molars and posterior to the molars.

2. Similar injections on the lingual aspect.

Anatomic variations are commonplace, and nerve intercommunication frequently exists. It is not desired to enter the controversy of the source of pain—but these injections have overcome many pain problems that occur. Often "signs" of anesthesia are present when no true anesthesia exists. By proper evaluation and additional injections as described previously, profound, true anesthesia can be obtained, and the patients' needs are satisfied.

Among many other factors producing anesthetic failure are the following:

1. If an injection is made too far from a structure, only a partial anesthesia or analgesia will be obtained.

2. Incorrect strength of solution, or inadequate amounts of the anesthetic agent will produce total or partial lack of anesthesia.

3. If injection is made into the correct region but in a blood vessel, anesthesia will not be produced and some patients are endangered. It should be remembered that in inferior alveolar injections, for example, it is more likely that a vessel will be hit than the nerve.

4. Infiltration into a badly lacerated region of mucosa will often provide extremely rapid absorption of the solution giving unusually high blood levels, and furthermore, many times will provide poor anesthesia.

■ *Summary*

This paper shows some of the methods of intraoral and extraoral injections for anesthesia for dentistry which have been found successful.

The necessary armamentarium and procedures prior to injections for anesthesia have been enumerated. These include the syringes, solutions and needles; the oxygen equipment; an emergency tray; and the use of premedicating agents.

By adequate premedication and block anesthesia, many procedures can be performed which might otherwise be painful, uncomfortable or impossible to accomplish with infiltration anesthesia alone.

Reactions of various types associated with local anesthesia have been greatly minimized with the use of intravenous administration of premedication.

■ *Conclusions*

1. Adequate anesthesia for dentistry with the use of various intraoral and extraoral injections combined with premedication provide a high degree of successful pain relief. A proper course of study should be pursued.[2]

2. Intraoral or extraoral methods can be used to fit the needs of the occasion or inclination of the doctor.

3. Local anesthesia using intraoral or extraoral injections and premedication have provided excellent patient comfort and safety. A combination of agents can be used for providing diverse, desirable results.

4. Adequate knowledge and proper armamentarium will furnish the greatest degree of success.

5. Complications from the various blocks per se have consisted of a transient diplopia in 5 per cent of the second division (maxillary) nerve blocks. This includes procedures performed by inexperienced but supervised dental officers in training.—*2303 West Mistletoe, San Antonio, Texas.*

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Department of the Air Force or the Air Service at large.

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Hydroxyzine: a new psychotherapeutic agent for anxiety in oral surgery

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Four clinical experiments, involving 158 acutely apprehensive patients, were carried out to determine the efficacy of hydroxyzine in controlling nervousness and apprehension. In the first experiment, the effects in 34 of 41 patients (83 per cent) receiving 50 mg. of orally administered hydroxyzine were rated "good." In a double-blind study, the effects of hydroxyzine in 51 of 67 patients (76 per cent) were rated "good," whereas the effects of a placebo in only 10 of 33 patients (30 per cent) were rated "good." In 9 of 10 patients receiving 100 mg. of hydroxyzine, the effects were rated "good." Blood pressure changes and pulse changes were negligible. Side reactions were dryness of the mouth in 28 patients (22 per cent), drowsiness in 5 (4 per cent), and dizziness in 1 (0.8 per cent). Hydroxyzine closely approaches the ideal drug for premedication in ambulatory oral surgical patients.

Nervousness and acute apprehension have long been the concern of oral surgeons. In an attempt to find a more effective premedication before oral surgical procedures, to foster better patient-doctor relationships and to have more cooperative and alert patients, a clinical investigation of hydroxyzine (Vistaril)[1] was carried out.

Hydroxyzine (Vistaril) is manufactured in two forms. The oral form contains hydroxyzine as the pamoate salt which is relatively insoluble in aqueous solutions. This also results in sustained psychotherapeutic action. The capsule form (hydroxyzine pamoate) is designated chemically as the 1- (p-chlorobenzhydryl) -4- [2- (2- hydroxyethoxy) ethyl] diethylenediamine salt of 1, 1' methylene bis (2- hydroxy- 3 naphthalene carboxylic acid).

The injectable form, which can be administered both intramuscularly and intravenously, contains the dihydrochloride salt of hydroxyzine which is water soluble.

In regard to safety, it has been reported that psychotic patients have received hydroxyzine in doses of 1,000 mg. daily for periods of up to 30 days with no significant toxic reactions.[2] A report has been published of a patient who received 300 mg. a day of hydroxyzine for over a

year with no ill effects.[3] Ayd[4] reported no toxicity from hydroxyzine during administration of up to 8 months in children and 11 months in adults.

In long-term studies the pamoate salt of hydroxyzine has been administered to dogs in doses up to 50 mg. per kilogram body weight daily for periods of six months with no ill effects.[5]

Hydroxyzine is well absorbed from the gastrointestinal tract and is excreted in the urine in significant amounts.

Hutcheon and co-workers[6,7] have demonstrated a muscle-relaxant effect of hydroxyzine in experimental animals. Their evidence indicated that the drug depressed both the monosynaptic and polysynaptic pathways by a supraspinal site of action, probably acting on the bulbar facilitatory center. Hypertonic muscles were more relaxed than normotonic muscles.

Levis and co-workers,[8] in extensive animal studies, found that hydroxyzine had potent antihistamine action.

Ayd[2] states that hydroxyzine is one of the safest of tranquilizers. "Troublesome side effects and allergic reactions to it have not been reported. It is well suited for school children and working adults since therapeutic doses rarely cause drowsiness or clouding of the consciousness."

Settel[9] found, "the outstanding characteristic of hydroxyzine was its ability to muffle exaggerated responses to external or internal stimuli without dulling the patient's perspective or sense of value. In this regard, it is distinctly superior to drugs inducing hypnosis and those producing euphoria."

Body metabolism is not changed, oxygen consumption is not decreased and there is no lowering of body temperature.

The action of hydroxyzine administered by mouth begins in 5 to 20 minutes, the maximum effect being approached in approximately 30 minutes.

The effect of the intravenous injection of hydroxyzine is immediate whereas the action of the intramuscular injection is within 3 to 5 minutes.

The duration of action is 2 to 6 hours whether administered orally or injected.

■ *Method of Study*

One hundred and fifty-eight patients, both male and female, who were acutely apprehensive and nervous, were selected from the outpatient oral surgery service of Grady Memorial Hospital. Patients ranged in age from 8 to 78 years with 110 patients (70 per cent) in the 20 to 50 year age range. No attempt was made to select patients according to physical status, sex or operation to be performed. Most of the operations included extractions, impactions and alveolectomies.

In order to evaluate these patients as objectively as possible, their blood pressure and pulse were recorded prior to the oral administration of hydroxyzine. Since the maximum effect is approached 30 minutes after administration, each patient was observed during this period. At the end of this time the blood pressure and pulse were taken again and the degree of tranquilization noted before and during the operation.

For the purpose of tabulating the data, the results were divided into three categories:

1. Good: Patient was calm and relaxed with no perceptible nervousness or apprehension.

2. Fair: Patient was calm and cooperative but there was perceptible nervousness or apprehension.

3. Poor: No tranquilizing effect.

The investigation consisted of four phases. In the first phase the effect of 50 mg. of hydroxyzine administered orally was studied. The second phase was a double-blind study of 100 patients using 50 mg. of orally administered hydroxyzine and placebo using random sampling technics. In the third phase the effect of 100 mg. of hydroxyzine taken orally was investigated. In the last phase the effect of intravenous administration of 50 mg. on ambulatory patients who were to be given general anesthesia was studied.

■ *Results and Discussion*

In the first phase of the investigation, 41 patients received 50 mg. of orally administered hydroxyzine. In 34 patients (83 per cent) the tranquilizing effect was rated as "good" for oral surgical procedures. In 7 patients (17 per cent), although the operation was performed satisfactorily, tranquilization was rated as "fair."

In order to substantiate these results, a double-blind study was made of 100 patients. Neither the investigators nor the patients knew whether hydroxyzine or placebo was orally administered. This investigation was carried out in the same manner as the first experiment using a 50 mg. capsule.

Among the 67 patients receiving hydroxyzine, the effects in 51 patients (76 per cent) were rated as "good," in 15 patients (22 per cent) as "fair" and in 1 patient (2 per cent) as "poor." In the latter instance, the surgical procedure was carried out with great difficulty.

Among the remaining 33 patients who received placebos in the double-blind study, the effects in 10 patients (30 per cent) were rated as "good," in 14 patients (43 per cent) as "fair," and in 9 patients (27 per cent) as "poor." It was evident to the investigators, in many instances, that a tranquilizer had not been administered.

Another phase of this study was to administer orally 100 mg. of hydroxyzine and observe the effect. Ten anxious and apprehensive patients were chosen at random. Among this group, the effects in 90 per cent or 9 patients were "good" and in 10 per cent or 1 patient "fair." It was readily observable that the patients had been given a tranquilizer. However, they were alert, cooperative and not drowsy or confused.

Since many of the ambulatory adult patients at Grady Memorial Hospital require general anesthesia, seven patients requiring one, two or three extractions were given 50 mg. of hydroxyzine dihydrochloride intravenously shortly before nitrous oxide anesthesia was administered. The effects in all these seven patients were rated "good." It is of interest that these patients dreaded an oral injection but tolerated an injection intravenously fairly well.

As far as blood pressure changes and pulse changes were concerned, the increases and decreases were so minimal as to be negligible.

All patients were questioned carefully and observed in the clinic for evidence of oral dryness, dizziness, drowsi-

ness, nausea, skin rashes, headache and visual disturbances. Of the 125 patients receiving hydroxyzine, 28 patients (22 per cent) had a dryness of the mouth, 5 patients (4 per cent) were drowsy and 1 patient (0.8 per cent) was dizzy.

■ *Summary*

1. Four clinical experiments, involving 158 patients, were carried out in order to determine the efficacy of hydroxyzine in controlling nervousness and apprehension in oral surgery.

In the first experiment, the effects in 34 of 41 patients, or 83 per cent, who received 50 mg. of orally administered hydroxyzine were rated as "good."

In the second phase, a double-blind study utilizing the same experimental technic and dosage of hydroxyzine was undertaken in which the effects in 51 of 67 patients, or 76 per cent of those receiving hydroxyzine were judged "good." Among the patients receiving placebos, the effects in 10 of 33 patients or 30 per cent were rated "good."

In the third experiment, the dosage of orally administered hydroxyzine was increased to 100 mg. and in 9 of 10 patients, or 90 per cent, the effects were evaluated "good." In these patients, tranquilization was readily evident.

In the last phase, seven ambulatory patients about to undergo general anesthesia (nitrous oxide-oxygen) were given 50 mg. of hydroxyzine intravenously. In all seven the effects were rated as "good."

2. Fifty milligrams of hydroxyzine appears to be the starting dosage. If the patient does not respond to this initial dose, an increase of 25 to 50 mg. should suffice for adequate tranquilization.

3. The maximum effect of orally administered hydroxyzine is approached in approximately 30 minutes. When the drug is injected intramuscularly, the effect is in 3 to 5 minutes and when the drug is injected intravenously, the effect is noted immediately.

4. Blood pressure changes and pulse changes were so minimal as to be negligible.

5. Side reactions were dryness of the mouth in 28 (22 per cent) of the patients, drowsiness in 5 (4 per cent), and dizziness in 1 (0.8 per cent).

■ *Conclusions*

In our opinion, hydroxyzine closely approaches the ideal drug for premedication in ambulatory oral surgical patients. It does not produce sedation or euphoria which is common with the other widely used premedicants. Side reactions are few.

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‡Chief, department of oral surgery, Grady Memorial Hospital.

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Blood sugar levels during the dental experience II. Effect of sedation on blood sugar in the waiting room

■ *E. Cheraskin,* M.D., D.M.D.; F. H. Flynn,† B.S., and L. R. Fess,† B.S., Birmingham, Ala.*

Since it is well known that anxiety and exposure to stress cause the adrenal glands to liberate endogenous epinephrine and this in turn will mobilize glycogen, the effect of sedation on diabetic and nondiabetic patients undergoing a dental experience has been studied. In sedated and nonsedated, diabetic and nondiabetic patients, the blood glucose level did not show a significant difference 45 minutes after administration of a sedative or placebo when compared with the initial blood glucose level in the waiting room. No significant difference was found when sedation was administered to patients with controlled diabetes and those with uncontrolled diabetes.

In an earlier report,[1] it was shown that the blood sugar concentrations of diabetic and nondiabetic patients obtained in the waiting room of the dental office are not significantly different from those derived under basal conditions.

This report will attempt to answer the following questions with regard to blood sugar content:

1. Does sedation alter the blood sugar concentration of the nondiabetic patient while he is seated in the waiting room of a dental office anticipating the extraction of a tooth?

2. Does sedation alter the blood sugar concentration of the diabetic patient while he is seated in the waiting room of a dental office anticipating the extraction of a tooth?

A third report[2] will analyze the effect of epinephrine in local anesthetic solutions on the blood sugar level. A fourth and last report[3] will consider the effect of tooth extraction on blood sugar concentration.

■ *Review of the Literature*

In order to understand the blood sugar changes which can occur while the patient is seated in the waiting room anticipating the extraction of a tooth, it is necessary to review briefly: (1) the effect of sedative agents on stress, and (2) the action of sedation on the blood sugar level.

EFFECT OF SEDATIVE AGENTS ON STRESS—Limited reports are available on the effect of sedative agents on stress. They may be grouped into: (1) studies on lower animals, and (2) studies on human beings.

1. DeBias, Paschkis and Cantarow[4] reported that chlorpromazine increases survival rates in adrenalectomized rats exposed to the stress of heat. They postulated that the protective mechanism against heat and cold differs from that which protects against other types of stress.

To investigate the suprarenal response to fatal body irradiation in the rat, Bacq and Fischer[5] gave pentobarbital followed by morphine. This was done to inhibit the hypothalamic-pituitary-adrenal response to stress. The premedicant did not decrease the mortality rate since the results were the same in the experimental and control groups.

2. Promazine and meprobamate versus placebos have been studied by Szmyd and McCall[6] in relation to postoperative sequelae in human patients after oral surgery. This study showed that pain, swelling and trismus were not affected significantly. This observation is emphasized by the unchanged postsurgical narcotic demand. The duration of postsurgical convalescence actually was increased significantly for patients receiving the drugs. McGuire and Leary[7] confirmed the observation that stress tolerance is reduced rather than improved with the use of meprobamate.

Cleghorn and his group[8] have observed, in patients with anxiety, that patients with the most severe form have greater relief with the placebo (isotonic saline) than with ACTH.

In a clinical report of 1,100 instances of major surgery, Lear, Chiron and Pallin[9] have shown that, although chlorpromazine reduces the need for preoperative narcotics and protects against shock, it has an undesirable hypotensive side-effect.

Beecher,[10] in his study using morphine versus a placebo as a pain reliever, has shown that the placebo is 77 per cent as effective as the morphine with the percentage effectiveness decreasing as the pain intensity diminishes. As in the study by Cleghorn's group,[8] the greatest relief with placebos was evidenced when pain symptoms were most intense.

EFFECT OF SEDATION ON THE BLOOD SUGAR LEVEL—The effects of sedation on blood sugar levels as reported in the literature have been well summarized by Goodman and Gilman in 1941[11] and in 1955.[12] It is interesting to note that the 14 years between editions necessitated no change in wording in the following quotation:

> The response of the blood sugar to medication with barbiturates varies considerably, dependent upon the particular drug selected, dose, route of administration, species being studied, and previous diet. In man, soporific doses do not significantly or consistently alter the level of blood sugar and barbiturates are not contraindicated in patients with diabetes mellitus.

The effect of sedation on the blood sugar level has been reported in: (1) studies on lower animals, and (2) studies on human beings.

1. Studies have been made on cats, dogs, rabbits, pigeons, rats, mice and hamsters. Three studies[13-15] utilized adre-

nalectomized or decerebrated animals. Morphine in adrenalectomized animals does not seem to yield the same hyperglycemic effects observed in control animals.[13,14] This seems to be due to the removal of the adrenal glands which ordinarily are stimulated by morphine to produce epinephrine with a resultant mobilization of glycogen.[16] In the decerebrated cat, morphine produces a transient hypoglycemia, the mechanism of which is not known.[15] Barbital lowers the blood sugar levels, at least for the first few hours, in pigeons and cats.[17] Amobarbital and pentobarbital seem to have little effect in lowering blood sugar levels after administration of ether or epinephrine, but pentobarbital prevents hyperglycemia when its administration precedes that of ephedrine.[18] Larson,[19] in an experiment using rats, found that morphine has little effect on blood sugar levels in small doses (12 mg. per kilogram), and a varied action with larger doses (25 or 50 mg. per kilogram). He found that barbiturates, in contrast to morphine, exert no effect on blood sugar levels when administered in dosages from 25 to 200 mg. per kilogram. Meperidine hydrochloride in small doses (15 mg. per kilogram) has no effect; in medium doses (30 mg. per kilogram), it causes slight hypoglycemia; and with larger amounts (50 mg. per kilogram), hyperglycemia.

Watts,[20] in a study of dogs, found sedative doses of pentobarbital to inhibit partially the hyperglycemic response to l-methadone and morphine. In another study on rabbits, Watts[21] discovered that preanesthetic amounts of 5 to 30 mg. of pentobarbital per kilogram have no action on blood glucose levels but inhibit the hyperglycemic effects of ether to an increasing degree with increase in dose. Norman and Hiestand[22] found that chlorpromazine produces hyperglycemia in the mouse and hamster and no change in the rat.

2. Rosenkrantz and Bruger[23] compared the effect of placebos versus phenobarbital in diabetic and normal persons undergoing the dextrose tolerance test. They found an increase in dextrose tolerance in those diabetic patients given phenobarbital. There was also a general increased tolerance on repeated performance for all (diabetic and nondiabetic) subjects, which was attributed to the allaying of anxiety and nervousness. In other words, blood sugar proved to be lower when anxiety was decreased either by drug (for example, phenobarbital) or by adaptation during repeated testing.

Reitmann[24] found that the administration of amobarbital sodium intravenously induces a slight hyperglycemia in psychotic and neurotic patients. Occasionally amobarbital also seems to depress transiently the glucose tolerance curve, apparently because of the hypothalamic action of the drug.

Hunter and Merivale[25] reported the case history of an adult man who, after a partial pancreatectomy, showed a normal glucose tolerance pattern. Seven years later, after one week of barbiturate therapy, another test definitely indicated diabetes mellitus. After this test the patient was given increasing doses of amobarbital (amylobarbitone) sodium for ten days, and a prolonged true glucose tolerance test was performed. This test again indicated severe diabetes mellitus. The use of the barbiturate was then discon-

tinued. Tests were made on the subsequent twelfth and nineteenth days. Although the sugar level was still high, the curve was more normal. No further tests could be made, but the authors estimated as long as four weeks for the blood level to return to within normal limits.

It would appear from this brief review of the literature that the statement by Goodman and Gilman[11,12] still stands and applies to sedative agents in general, though their reference deals more directly with the barbiturates. The report most pertinent to the present investigation is that of Rosenkrantz and Bruger.[23] From their study, it appears that persons with anxiety show slight hyperglycemia and that relief of apprehension (either by barbiturates or education) counters the elevated blood sugar.

■ *Method of Investigation*

The entire study, which is being described in four parts, was performed on 80 patients in the department of oral surgery of the University of Alabama School of Dentistry. The project included 63 Negroes and 17 white persons; 71 females and 9 males. The patients ranged in age from 16 to 80 years in the nondiabetic group and from 18 to 80 in the diabetic category. Included in the group were 60 nondiabetic, 14 uncontrolled diabetic and 6 controlled diabetic patients.

The procedure used in this study was designed to reproduce, as nearly as possible, the situation in the average office. This plan was previously described in connection with the first phase of this investigation[1] and in a study of the effect of the dental experience on blood pressure and pulse rate.[26-29]

In the first portion of this study,[1] attention was focused on the blood sugar concentration of the patient while seated in the waiting room anticipating the extraction of a tooth. Immediately after the patient arrived in the waiting room, he was seated in a chair, the finger was pricked and capillary blood drawn. All the microestimations of blood sugar were made with Folin filtrate.[30] Immediately thereafter, each patient was given a red capsule. In some instances, the capsule contained 1½ grains of secobarbital; in others, the capsule served as a placebo. The investigator did not know the contents of the capsule.

Precisely 45 minutes later by stop watch, the patient was ushered into the operatory and seated in the dental chair. Again the finger was pricked and capillary blood drawn to determine the blood sugar concentration. In this manner the blood sugar level obtained in the waiting room was compared with that observed in the dental chair 45 minutes after the administration of a sedative agent or a placebo.

Actually, 60 experiences in nondiabetic and 20 experiences in diabetic patients were studied under these conditions. The findings of this group of 80 different experiences constitute the subject of this report.

■ *Results*

The findings will be considered in two categories: (1) the blood sugar concentration of the patient while seated in the waiting room anticipating the extraction of a tooth, and (2) the level of blood sugar 45 minutes after the administration of a sedative agent or a placebo.

On the basis of the history, the clinical record and a glucose tolerance test, the subjects were divided into four groups: (1) sedated nondiabetic, (2) nonsedated nondiabetic, (3) sedated diabetic and (4) nonsedated diabetic patients.

BLOOD SUGAR LEVEL IN THE WAITING ROOM—For sedated nondiabetic patients the blood sugar concentrations ranged from a high of 126 mg. per hundred cubic centimeters to a low of 80 mg., with a mean for the group of 108.5 mg.

In nonsedated nondiabetic patients the blood sugar level ranged from a high of 130 mg. per hundred cubic centimeters to a low of 68 mg. The mean for this group was 102.4 mg.

The sedated diabetic patients showed a greater spread of blood sugar concentrations in the waiting room than was obtained in the nondiabetic groups. Actually, the range for the sedated diabetic patients extended from a high of 282 mg. per hundred cubic centimeters to a low of 100 mg. The mean for the group is 176.4 mg.

For the nonsedated diabetic group the blood sugar concentration ranged from a high of 396 mg. per hundred cubic centimeters to a low of 92 mg. The mean blood sugar level was 182.9 mg.

BLOOD SUGAR LEVEL FORTY-FIVE MINUTES AFTER ADMINISTRATION OF SEDATIVE OR PLACEBO—In sedated nondiabetic patients the blood sugar concentrations ranged from a high of 130 mg. per hundred cubic centimeters to a low of 84 mg. The mean for the group was 104.3 mg.

In nonsedated nondiabetic patients the range of blood sugar concentrations was from a high of 130 mg. per hundred cubic centimeters to a low of 64 mg. The mean blood sugar level was 99.9 mg.

In sedated diabetic patients the blood sugar concentrations ranged from a high of 236 mg. per hundred cubic centimeters to a low of 100 mg. The mean blood sugar level for the group was 148.8 mg.

In nonsedated diabetic patients the blood sugar concentrations ranged from 388 mg. per hundred cubic centimeters to 92 mg., with a mean of 169.1 mg.

■ *Discussion*

Table 1 indicates that the blood sugar concentration was higher in the waiting room than it was 45 minutes later after the administration of a placebo or sedative agent. This was generally true whether the group was diabetic or nondiabetic, sedated or nonsedated. The decrement is probably physiologic (increasing time since last carbohydrate ingestion) and, in every instance, the probability values indicate the lack of statistical significance.

Table 1 indicates that the diabetic group experienced a greater mean decrease in blood sugar concentrations than the nondiabetic patients. This is true of both sedated and nonsedated groups. Again, the fall is probably physiologic because of the period of fasting. In no instance are the data statistically significant.

The results in these groups are not in agreement with those of Rosenkrantz and Bruger.[23] However, no real comparison can be made because of the many different variables in the two experiments. For example, the subjects in their study,

Table 1 • Comparison of the blood sugar initially (in the waiting room) with that obtained 45 minutes later in the dental chair

Type of patient	Number of patients	Degrees of freedom	Mean blood sugar in waiting room in mg. %	Mean blood sugar under basal conditions in mg. %	Difference		Standard error of difference of means	Observed t value	P
					Range	Mean			
Nonsedated nondiabetic	38	36	102.4	99.9	−34.4 to + 27.6	− 2.5	± 3.1	0.792	>.40
Sedated nondiabetic	22	20	108.5	104.3	−28.5 to + 17.5	− 4.2	± 3.5	1.204	>.20
Nonsedated diabetic	11	9	182.9	169.1	−90.9 to +213.1	−13.8	±36.2	0.381	.50
Sedated diabetic	9	7	176.4	148.4	−76.4 to +105.6	−28.0	±20.7	1.350	>.20

if apprehensive, might well have been so only minimally (the only possible cause for anxiety was the threat of a glucose tolerance test). In contrast, the subjects in this experiment were aware of the impending oral surgical procedure.

Attention should be directed to the column showing the mean difference in Table 1. The average decrease in blood sugar in the sedated nondiabetic patients is almost twice that observed in the nonsedated nondiabetic patients. In other words, the ratio is approximately two to one. Similarly, there is the same ratio among the diabetic patients with the sedated persons showing a blood glucose mean difference almost twice that noted in the nonsedated diabetic group. However, the lack of statistical signifiance is clearly shown in Table 2 where the sedated groups are compared directly with the nonsedated groups.

It can be observed in Table 1 that the nonsedated diabetic patient group shows a mean difference five times that for the nonsedated nondiabetic patient group. A seven to one ratio can be seen by comparing the mean differences of the sedated diabetic group and the sedated nondiabetic group. Again, Table 2 shows

Table 2 • Blood sugar concentrations of sedated and nonsedated patients in the waiting room and 45 minutes after administration of a sedative or placebo

Type of patient	Number of patients	Degrees of freedom	Mean blood sugar sedated group	Mean blood sugar nonsedated group	Mean difference	Standard error of difference of means	Observed t value	P
Waiting room								
Nondiabetic	60	58	108.5	102.4	− 6.1	± 3.5	1.742	>.05
Diabetic	20	18	176.4	182.9	+ 6.5	±30.5	.211	.50
45 minutes later								
Nondiabetic	60	58	104.3	99.9	− 4.4	± 3.3	1.333	>.10
Diabetic	20	18	148.4	169.1	+20.7	±28.4	.729	>.40

Table 3 • Blood sugar concentrations of controlled and uncontrolled diabetic patients in the waiting room and 45 minutes after administration of a sedative or placebo

Type of patient	Number of patients	Degrees of freedom	Mean blood sugar controlled diabetic group	Mean blood sugar uncontrolled diabetic group	Difference	Standard error of difference of means	Observed t value	P
Waiting room								
Sedated	9	7	172.0	177.7	+ 5.7	±33.7	.169	.50
Nonsedated	11	9	158.0	197.1	+39.1	±45.0	.868	>.40
45 minutes later								
Sedated	9	7	151.0	147.7	− 3.3	±22.3	.147	.50
Nonsedated	11	9	155.5	176.9	+21.4	±45.0	.476	.50

the lack of statistical significance for this comparison.

The question logically arises whether the effect on the blood sugar in patients with controlled diabetes mellitus is different from that in patients with uncontrolled diabetes mellitus. Tables 3 and 4 summarize, within the limits of this small sample, that there does not appear to be any significant difference in the glucose behavior of these groups.

■ *Summary*

There is a paucity of literature to evaluate the effect of sedation on blood sugar and the action of sedation on stress.

Within the limits of this experiment, the blood sugar concentration of the patient seated in the dental chair 45 minutes after the administration of a sedative or placebo agent appears to be essentially unchanged when compared with the initial blood sugar level while the patient is seated in the waiting room. This result was noted in sedated and nonsedated, diabetic and nondiabetic patients.

A report to follow[2] will analyze the effect of epinephrine on the blood sugar during and after the injection of a local anesthetic solution.

Table 4 • Blood sugar concentrations of sedated and nonsedated, controlled and uncontrolled diabetic patients in the waiting room and 45 minutes after administration of a sedative or placebo

Type of patient	Number of patients	Degrees of freedom	Mean blood sugar sedated group	Mean blood sugar nonsedated group	Mean difference	Standard error of difference of means	Observed t value	P
Waiting room								
Controlled diabetic	6	4	172.0	158.0	−14.0	±33.4	0.410	.50
Uncontrolled diabetic	14	12	177.7	197.1	+19.4	±45.2	0.429	.50
45 minutes later								
Controlled diabetic	6	4	151.0	155.5	+ 4.5	±25.7	0.175	.50
Uncontrolled diabetic	14	12	147.7	176.9	+29.2	±43.1	0.677	.50

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†Trainee in epidemiology, National Institutes of Health, University of Alabama School of Dentistry.

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■ Public Health Education

Organized community health education in the United States, as it is presently practiced, does more than educate people about health. Owing to the very nature of the methods utilized, which are based on the best current understanding of the educational process, the people themselves are required to assume responsibility for their own and their community's health through understanding their health problems, planning for prevention, eradication or control, and acting on their plans. This approach necessarily guides people into a consideration of health in its broadest meaning, because emerging and existing health problems in this country are multifaceted in both origin and solution. The problem-solving approach applied to these current health problems, which have many roots, has a real potential for deepening and developing the public's experience in democracy and, at the same time, focusing their interest and concern on the total development of their communities rather than upon health alone. Viewed in this way, public health education is adult education in the most fundamental sense.—*Beryl J. Roberts and William Griffiths. Handbook of Adult Education in the United States, 1960.*

Retromolar osteotomy for the correction of prognathism

■ *Giorgio Dal Pont, M.D., Belluno, Italy*

The advantages of the retromolar osteotomy as done by the author are (1) a better adaptation of the fragments; (2) minimal muscular displacement, and (3) a greater possibility for correction of prognathism, micrognathia and open bite.

Two procedures for retromolar osteotomy have been developed. They are (1) sagittal, in which bone incision lies on a plane that starts near the edge of the linea obliqua and extends sagittally between the cortical plates from the retromolar region up to the mandibular angle; (2) oblique, in which the section begins at the edge of the linea obliqua and passes under the molars and retromolar region to emerge lingually along the mylohyoid groove. A case report is presented.

In discussions of the retromolar osteotomy for the correction of prognathism, different sectioning lines through the lower jaw have been recommended with a view to resolving the problems connected with the degree and kind of malformation, operative procedure, complications and final result. Apart from partial or total relapse, the following difficulties arise most frequently: open bite, pseudoarthrosis, temporomandibular joint dysfunction, insufficient function, esthetic failure in the region of the angle, osteomyelitis, paresthesia, facial palsy, auriculotemporal syndrome, dangerous hemorrhage, parotitis and parotid fistula.

The reasons for such complications and failures lie in the method utilized, in insufficient preoperative preparation for the new dental occlusion, inadequate intermaxillary fixation, lack of adaptation of the fragments, in the general condition of the patient, and in muscular displacement.

In the surgical correction of prognathism, micrognathia and open bite, it is difficult to avoid a certain degree of muscular displacement. In most instances of osteotomy of the ascending ramus, the most powerful muscles of mastication, the masseter and pterygoideus internus, are forced into a new position after the displacement of the anterior fragment. The muscular displacement calls for a prolonged period of intermaxillary fixation and postoperative care and at times results in relapse and open bite.

Schmuziger suggests cutting the

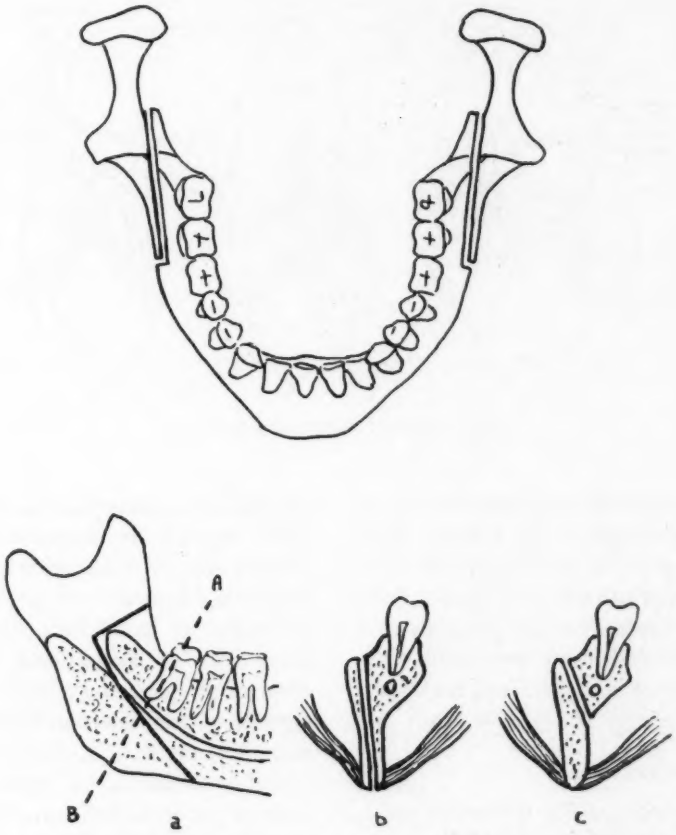

Fig. 1—Above: Top view of retromolar osteotomy. Below: Two possibilities of performing retromolar osteotomy. In first instance (b), the masseter muscle is left on distal fragments whereas the internal pterygoid muscle moves together with displaced larger fragment. In second instance (c), both muscles remain on distal fragments

muscles from the mandible, to avoid the superior displacement of the posterior fragment. Reichenbach also deals with this problem and arrives at the same conclusion.

The transverse sectioning of the ascending ramus often results in an insufficient union of the fragments and displacement of the superior fragment. The oblique sectioning described by Kazanjian permits a better adaptation of the fragments. Schuchardt uses a new intraoral procedure and cuts through the internal cortical plate above the lingula and then cuts through the external cortex 1 cm. below. Obwegeser increases this distance and thereby increases the contact surfaces.

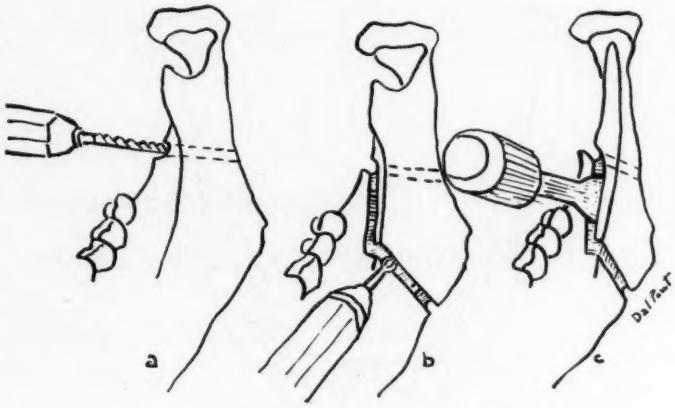

Fig. 2—Sagittal retromolar osteotomy

The retromolar osteotomy which I have utilized permits (1) a better and easier adaptation of the fragments; (2) broader contact surfaces; (3) greater possibility for correction of prognathism, micrognathia and open bite; and (4) avoidance as much as possible of muscular displacement (Fig. 1).

■ *Procedures*

Two procedures for retromolar osteotomy have been developed, as follows.

SAGITTAL RETROMOLAR OSTEOTOMY —In sagittal retromolar osteotomy the surface of the bone incision lies on a plane that starts near the edge of the linea obliqua and extends sagittally from the retromolar region up to the mandibular angle between the cortical plates (Fig. 2).

After the incision of the mucosa and periosteum along the linea obliqua, the soft tissues and neurovascular bundle are elevated from the internal surface of the ascending ramus, just above the lingula. With a Lindemann bur, a cut is made through the cortical plate. A similar cut is made through the buccal cortical plate of the body of the mandible starting from the linea obliqua at the level of the second molar area up to the lower border of the mandible. The lingual and buccal cuts are then connected by a third cut extending along the anterior border of the ascending ramus. (To make these cuts it is also possible to drill some holes with a round bur and then connect them.) A chisel is then pushed along the external cortical plate. The fracture line has a tendency to run between both cortical plates to reach the posterior border of the mandible.

OBLIQUE RETROMOLAR OSTEOTOMY —In oblique retromolar osteotomy the sectioning begins at the edge of the linea obliqua and passes under the last molars and the retromolar region to emerge lingually along the mylohyoideus groove (Fig. 3). In the angle region the sagittal method is preferred for esthetic reasons; the oblique method is used to avoid the

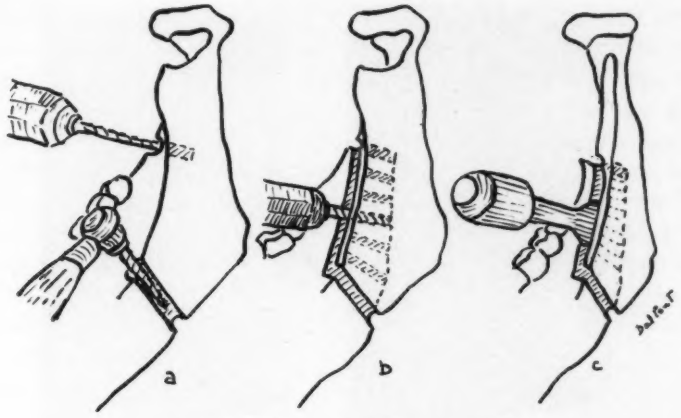

Fig. 3—Oblique retromolar osteotomy

dislocation of the masseter and pterygoideus internus muscles.

After the incision of the soft tissues intraorally along the linea obliqua, the internal cortical plate is cut by means of a fissure or a Lindemann bur just above the lingula extending halfway to the posterior border of the mandible, just behind the neurovascular bundle. Another cut is made through the external cortex of the body starting from the linea obliqua at the level of the second molar and extending to the lower border of the mandible. The lingual and the buccal cuts are then connected by a third cut running along the linea obliqua and penetrating the

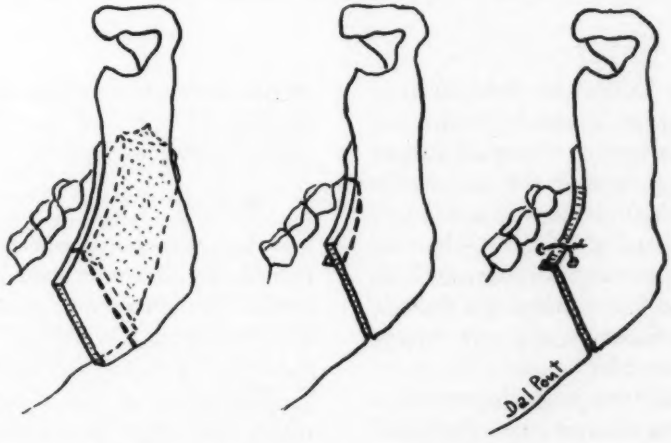

Fig. 4—Piece of cortical bone is removed and fragments adapted. A wire may be used for fixation if necessary

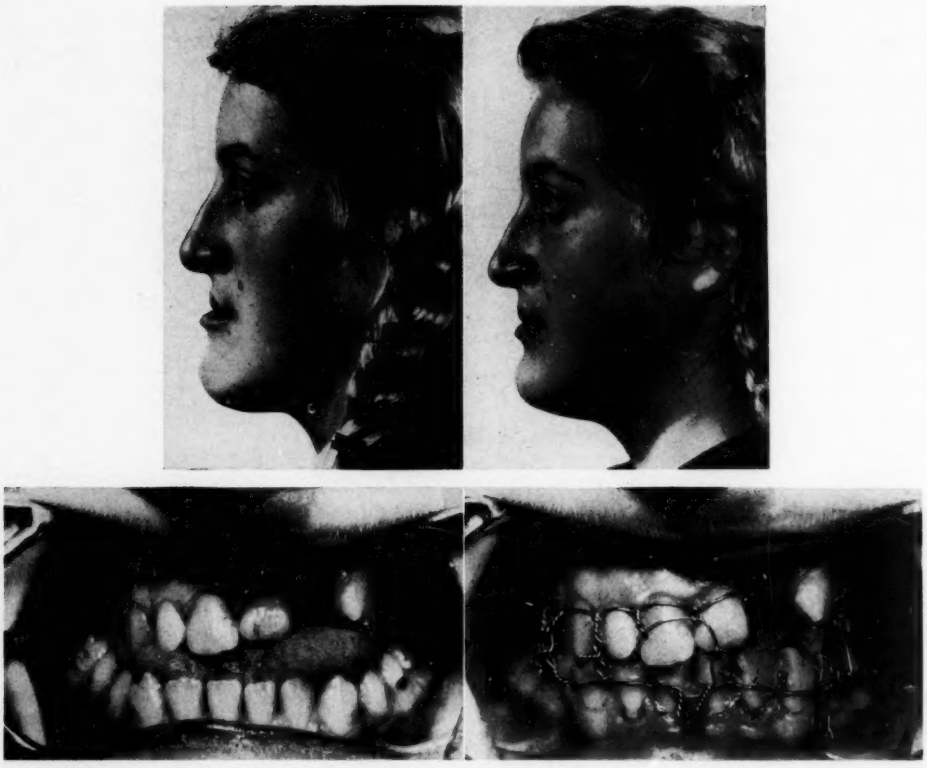

Fig. 5—Above: Appearance before and after retromolar osteotomy. Below: Occlusion before and after operation

spongiosa in an oblique direction from buccal to lingual. (Some deep holes may be drilled toward the internal cortical plate, passing beneath the mandibular canal.) A chisel is then inserted and pushed along the guide holes. The fracture line may go into the upper two thirds of the section line, through the mandibular canal without causing any damage to the neurovascular bundle.

To correct the prognathism a piece of cortical bone is removed on the buccal aspect and in the anterior border of the ascending ramus, for proper adaptation of the fragments. No fixation is needed normally. When desired a wire can be used as shown in Figure 4.

■ *Report of Case*

A retromolar osteotomy was performed (Fig. 5) under endotracheal anesthesia. The mucosa was cut on the right side starting at the level of the second molar and extending superiorly along the anterior border of the ascending ramus where some muscular attachments were excised. The periosteum was detached from the buccal aspect of the mandible

up to the inferior border, and from the medial aspect just above the lingula. Here, using a Lindemann bur, a cut was made through the cortical plate. Another cut was made at the level of the third molar vertically to the lower border of the mandible. Drill holes were made through the cortex with a round bur. A Lindemann bur was used to connect these holes. The lingual and the buccal cuts were then connected by a third cut running along the anterior border of the ascending ramus. A chisel was then inserted and the cortical plates split free.

The same procedure was done on the left side. After the sectioning, the mandible was brought into the new position as calculated on the model. In order to obtain a good adaptation of the fragments, a portion of buccal cortex was removed on the right side. The mucosa was sutured.—*Piazza Mazzini 19.*

Tooth transplantation procedures utilizing bone graft materials

■ *Philip J. Boyne,* D.M.D., Washington, D. C.*

A study was undertaken in which 15 unerupted, fully formed, maxillary cuspids were transplanted into the dental arch utilizing bone implant material around the root. In five instances, homogenous freeze-dried bone was used and in ten instances ethylenediamine-treated heterogenous bovine bone was used. The technic used is described in two case reports. In all ten of the instances in which ethylenediamine-treated bone was used, root resorption was evident within six months postoperatively. In the remaining five instances in which homogenous freeze-dried bone was used, only one instance showed evidence of root resorption at the end of three years.

Considerable evidence has been presented during recent years in support of various autogenous tooth transplantation technics.[1-4] Limitations, however, with respect to the stage of root development at which these surgical procedures may be carried out have restricted such autogenous transplantation to patients of the younger age groups. A study was undertaken three years ago in an effort to determine the efficacy of using various bone graft materials in autogenous tooth transplantation procedures involving fully developed teeth in adult patients.

Two types of osseous implant materials were used in a portion of this study: freeze-dried homogenous bone and ethylenediamine-treated heterogenous bone. The freeze-dried homogenous bone was prepared by the tissue bank of the Naval Medical School, National Naval Medical Center, Bethesda, Md. In the past, freeze-dried osseous homografts have been efficaciously applied to the treatment of cystic bone lesions of the mandible and maxilla.[5,6] The utilization of freeze-dried homogenous graft material in the autogenous transplantation and surgical positioning of teeth in adult patients had met with initial clinical success.[7] Previous experimental use of ethylenediamine-treated heterogenous bone in osseous defects had indicated initial host acceptance of the implanted material.[8] In addition, clinical healing appeared to be uniformly uneventful in long-term cases involving the implantation of ethylenediamine-treated bone. However, histologic examination of implants of ethylenediamine-treated bone one to two years postoperatively, in both experimental animals and clinical human patients, have indicated a persistence of the implanted bone particles with minimal osteoclastic and osteoblastic activity at the periphery of the particles and minimal resorption and remodeling of the implant material.[9,10] The study of the effects of ethylenediamine-treated heterogenous bone implants in tooth transplantation technics was part of the over-all clinical evaluation of this osseous material in oral surgical procedures.

In this research project a total of 15 unerupted fully formed maxillary cuspids were transplanted into a normal alignment in the dental arch, after a new alveolus had been prepared in the alveolar bone to receive the transplanted tooth. The bone implant material was inserted around the root of the transplanted tooth in the new alveolus. Of these 15 transplants, 5 involved the use of homogenous freeze-dried bone implant to surround the transplanted tooth, and 10 utilized ethylenediamine-treated heterogenous bovine bone. The cases involving the implantation of freeze-dried bone were followed clinically and roentgenographically for three to four years postoperatively, and the ten cases involving the use of ethylenediamine-treated bone were followed for two to three years after surgery. The patients' ages ranged from 21 to 35, with the mean being 26. Representative cases in each group are reported here to illustrate the technics and the results.

■ *Report of Cases*

CASE 1—A 30 year old sailor reported to the dispensary, U. S. Navy Department, Washington, D. C., on October 1, 1956, for the extraction of a maxillary deciduous cuspid. Oral examination revealed a retained left deciduous cuspid which was extremely mobile (Fig. 1, left). Roentgenographic examination demonstrated the deciduous cuspid and a palatally impacted maxillary left permanent cuspid having a mesial inclination of approximately 45 degrees, with its crown contacting the lingual aspect of the incisor (Fig. 1, right). On October 31, the following operation was performed:

With the patient under 2 per cent lidocaine infiltration anesthesia, an incision was made at the cervical, lingual margins of the maxillary anterior teeth. The palatal flap outlined by this incision

was elevated from the region of the right second bicuspid to the left second bicuspid. The underlying impacted permanent cuspid was exposed. After excision of the overlying bone, the tooth was removed gently. Removal was accomplished with forceps which had been modified by molding gutta-percha between the beaks as suggested by Thoma.[11]

Bone burs and fine narrow chisels were used to recontour the socket, and the tooth was transplanted into the normal position in the dental arch. Small fragments of reconstituted freeze-dried homogenous cancellous bone were selected and placed between the tooth and the reshaped alveolus (Fig. 2, left). No endodontic treatment was undertaken at this time. The mucoperiosteal flap was reapproximated and closed with no. 0000 monofilament nylon interrupted sutures. The tooth was checked for occlusal interferences and was stabilized to the second bicuspid by means of orthodontic stainless steel bands (Fig. 2, center).

The patient was given 300,000 units of penicillin procaine intramuscularly daily for four days. Codeine sulfate ½ grain every four hours was prescribed for pain. Warm saline mouthwashes were prescribed to be used every four hours to begin on the first postoperative day.

The postoperative course was uneventful; the patient experienced only mild discomfort, and the sutures were removed on the fifth postoperative day. Follow-up roentgenographic and clinical examinations were made weekly for one month and thereafter at three month intervals. Four months postoperatively the orthodontic bands were removed. The tooth was found to be firm and immobile. An apparent clinical new attachment of the periodontal structures had occurred as evidenced by gutta-percha probes inserted to the depth of the periodontal sulcus (Fig. 2, right). Six months postoperatively the root canal was opened and the contents removed. A root canal silver point filling was inserted. Histologic examination of the contents of the root canal revealed necrotic debris with no revascularization of the canal by the periapical tissues. Three years postoperatively the tooth was still firm and immobile with no periodontal inflammation (Fig. 3, left). Roentgenograms revealed no evidence of root resorption (Fig. 3, right).

CASE 2—On September 1, 1957, a 26 year old Marine reported to the dental clinic, Marine Corps Base, Twenty-nine Palms, Calif., for the extraction of a "loose tooth." Examination revealed a right deciduous cuspid which was extremely mobile. Roentgenograms demonstrated an impacted right permanent cuspid (Fig. 4, left). On September 10, 1957, with the patient under 2 per cent lidocaine infiltration anesthesia, the following operation was performed:

An incision was made palatally at the cervical margins of the anterior teeth, and a mucoperiosteal palatal flap was raised from the second bicuspid to second bicuspid region. The underlying impacted cuspid was exposed by the removal of overlying bone tissue, and the tooth was gently elevated from its alveolus. A new alveolus in the alveolar ridge was prepared for the transplanted tooth. After insertion of a root canal filling, the tooth was transplanted into correct position in the dental arch, and ethylenediamine-treated bovine

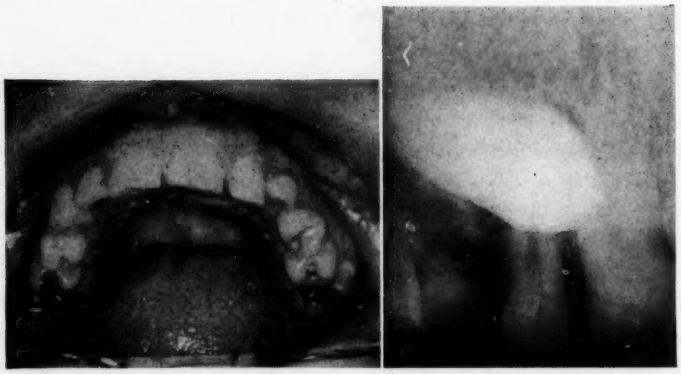

Fig. 1—Case 1. Left: Preoperative view of retained left deciduous cuspid. Right: Periapical view of impacted permanent cuspid

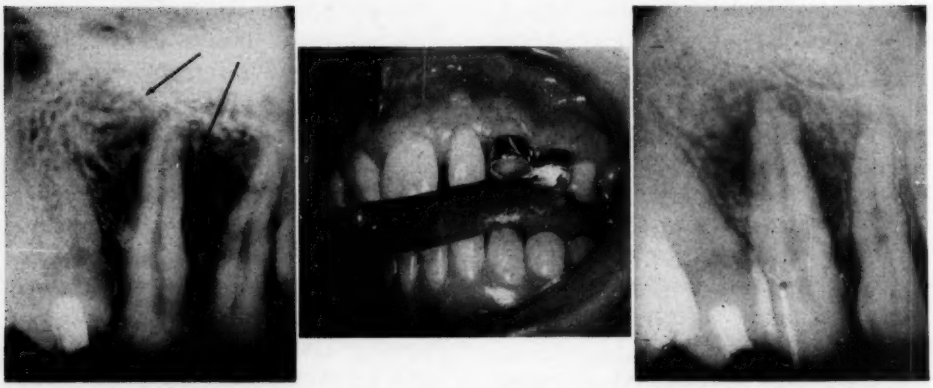

Fig. 2—Case 1. Left: View taken immediately after transplantation of impacted cuspid before placing orthodontic bands. Arrows indicate implant of freeze-dried cancellous bone. Center: Clinical appearance of transplanted cuspid on sixth postoperative day. Right: View taken four months postoperatively after removal of orthodontic bands. Level of apparent clinical new attachment of periodontal structure is indicated by gutta-percha probes inserted to depth of periodontal sulcus

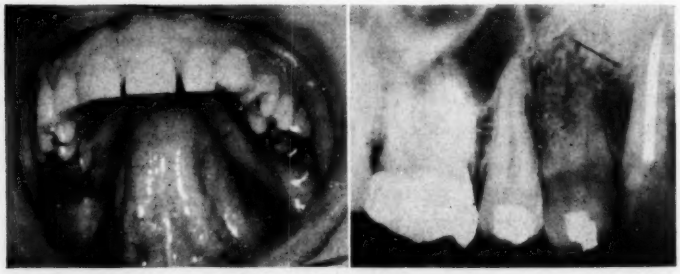

Fig. 3—Case 1. Left: Transplanted cuspid three years postoperatively. Right: View three years postoperatively shows no evidence of root resorption

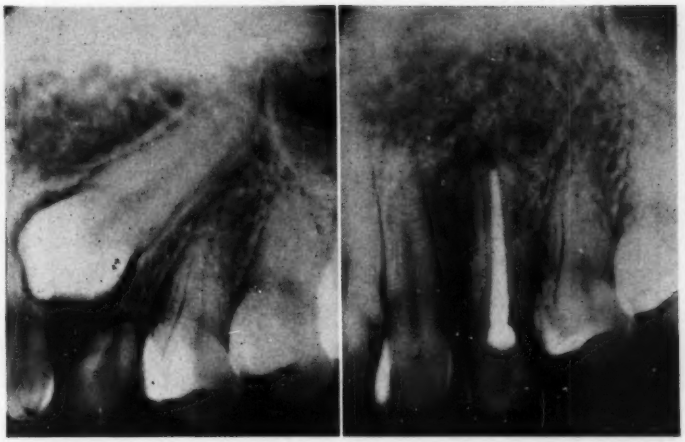

Fig. 4—Case 2. Left: Preoperative view showing impacted maxillary permanent right cuspid with retained deciduous tooth. Right: View after transplantation of impacted cuspid with periradicular implant of ethylenediamine-treated bone. Note resorption of lateral aspect of root

bone particles were inserted around the tooth. Orthodontic stainless steel bands were fabricated to stabilize the transplanted tooth to the first bicuspid. The postoperative course was uniformly uneventful, and five months after the surgical intervention, the orthodontic bands were removed. At that time the tooth was firm and immobile, and clinically the transplantation procedure appeared to be successful. Examination one year postoperatively, however, revealed roentgenographic evidence of resorption of the lateral aspects of the root of the transplanted tooth as seen in Figure 4, right. Although clinically the tooth was still immobile and there was no periodontal inflammation, the root resorption appeared to be noticeably progressive.

■ *Results*

All ten transplanted impacted maxillary cuspids for which ethylenediamine-treated bone had been used as a periradicular graft material showed varying degrees of root resorption, starting usually within six months postoperatively. In three instances, the resorption was progressive to the point of severe loosening of the tooth, necessitating the extraction of the transplanted tooth. In the remaining seven instances, the tooth remained immobile, and clinically appeared to be without periodontal inflammation. It would appear that the varying degrees of root resorption in the remaining seven instances would preclude retention of the transplant as a functional tooth for any significant length of time. The root resorption did not appear to be related to the time at which endodontic treatment was undertaken. All seven teeth in which root canal fillings were placed at the time of transplantation exhibited varying degrees of radicular resorption, as did the eight teeth in which root canal fillings were placed four to six

Fig. 5—Case 3. Left: Preoperative view of impacted maxillary right cuspid. Patient had been edentulous in this region for eight years. Center: View immediately after transplantation of impacted cuspid. Ethylenediamine-treated heterogenous cortical bone particles (arrow) are filling old alveolus of impacted tooth and surrounding root of cuspid in its new position. Right: View six months postoperatively showing severe resorption of cuspid root. Note unresorbed ethylenediamine-treated bone in cuspid alveolus (arrow)

months postoperatively as shown in Figure 5, Case 3.

Of the five instances in which freeze-dried bone had been used as an implant material to surround the transplanted cuspid, in only one instance was there evidence of any root resorption at the end of a three year observation period. In this instance, resorption near the cervical region occurred; it was considered to be very minimal (Fig. 6, left). The periodontal tissues appeared clinically normal in this instance, and the tooth was functioning in a healthy manner (Fig. 6, right).

■ *Comment*

The clinical failure and the poor prognosis in instances in which ethylenediamine-treated bone was utilized can possibly be attributed to the slow replacement of the implanted ethylenediamine-treated bone particles surrounding the root of the transplanted tooth. The bone implant in these instances was demonstrable by clinical roentgenograms for 12 months or longer postoperatively. This observation parallels that of a clinical study in which ethylenediamine-extracted bone implants were used in cystic and apical bone defects.[9] This persistence of implanted ethylenediamine bone particles, as viewed histologically, over prolonged periods of postoperative evaluation and the tendency toward fibrous connective tissue invasion of the bone particles would tend to indicate limitations in the clinical use of this material in oral surgical procedures.

■ *Summary*

The clinical and roentgenographic evidence in this study would suggest the possibility of utilizing homogenous banked bone as a periradicular implant in tooth transplantation procedures. It would appear, at this time, that freeze-dried homog-

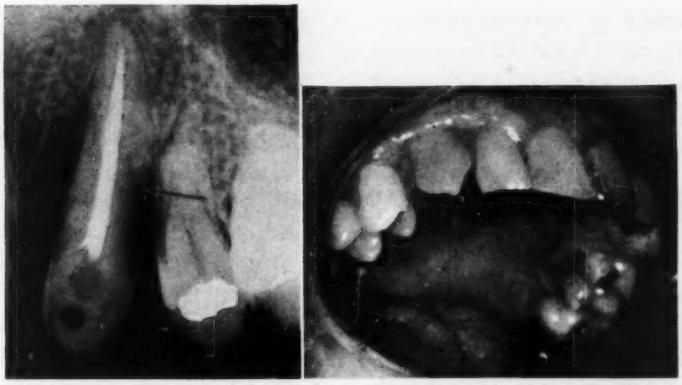

Fig. 6—Case 4. Left: View three years and eight months after transplantation of cuspid in which freeze-dried bone had been used to surround root. Slight degree of resorption at distal cervical margin shown by arrow. Right: Clinical view of transplanted tooth shown at left three years postoperatively

enous cancellous bone is the material of choice in the utilization of this technic of autogenous transplantation of fully developed cuspids in adult patients.

The possibility of applying this procedure to other teeth in the arch warrants consideration.

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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■ Excellence

Excellence implies more than competence. It implies a striving for the highest standards in every phase of life. We need individual excellence in all its forms, in every kind of creative endeavor, in political life, in education, in industry—in short universally. And, not least, we need excellence in standards of individual conduct. *Life Magazine. The National Purpose. John W. Gardner. Chicago Daily News June 25, 1959.*

Opportunities for anesthesia in hospital dental practice

■ *John T. Martin,* M.D., Rochester, Minn.*

It is becoming more and more necessary, as the age of the population increases and new medications are advanced for the treatment of disease, that facilities for the hospitalization of patients requiring general anesthesia for dental procedures be made available. Patients with underlying systemic disease which precludes general anesthesia in the dental office may be cared for with facility in the hospital by trained personnel using the latest technics and drugs. Adequate preanesthetic evaluation is a most important factor in the preparation of the patient. Certain situations are listed in which the patient is more adequately cared for in the hospital where general anesthesia can be utilized.

The Regional Conference on Hospital Dental Service has as its aim the extension and improvement of hospital dental services as part of a broad effort to provide better dental care for growing numbers of patients. Such an aim is praiseworthy and receives the wholehearted support of anesthesiologists as a group. Hence it is fitting that we examine the contributions anesthesia can make to hospital dental practice and compare the problems involved with those of anesthesia that is administered in the office.

Dentists have long been noted for their skill as regional anesthetists. Relief of pain in the dental office through general anesthesia occupied the attention of many of the physicians who pioneered anesthesiology as a specialty. A Minneapolis dentist, J. A. Heidbrink, was the developer of an excellent series of anesthetic apparatuses that have served humanity well in many lands. Today general anesthesia in dental office practice is a constant occurrence occupying the primary attention of dentists, dental anesthesiologists, nurse anesthetists, and a few physician anesthesiologists. In many instances great care is taken to see that the physical condition, allergic history, and laboratory status of each patient are carefully understood before anesthesia is administered. Mature arrangements such as this produce a high degree of anesthetic safety and excellent patient care. In the absence of such a knowledgeable approach, risks may be taken that place the patient in dangerous situations. Since most dental patients are basically in good health, the accident rate with less than expertly administered general anesthesia is probably lower than would be sus-

pected; this does not, however, commend the casual approach to widespread use.

In view of the general good health of dental patients and the excellent experience with careful outpatient general anesthesia, no one would suggest that every patient who undergoes dental procedures requiring general anesthesia should be hospitalized. Despite this, certain patients needing general anesthesia require more care than can be provided in the dental office, and hospitalization will always have a place in dental practice. Consequently there is need to examine in detail the anesthesia resources and requirements of the usual hospital.

■ *Anesthesia Service in the Hospital*

Anesthesia services vary in their organization from one hospital to another. Most university centers have a carefully organized department of anesthesiology within the division of surgery to provide services for the various areas in the hospital in which anesthesia is needed. Usually the department is physician-staffed, with or without nurse technicians. In the private hospitals may be found full-time, trained anesthesiologists in private practice, dental anesthesiologists providing services mainly limited to dental and head and neck procedures, nurse anesthetists employed by an anesthesiologist or surgeon, nurse anesthetists employed by the hospital or in private practice for themselves, physicians and dentists who administer anesthesia when other demands of their practices permit, and occasionally other less qualified technicians with some knowledge of anesthesia.

The physician, of course, is legally responsible for his practice. Although the situation may vary from place to place, this can be said also of the dental anesthesiologist administering anesthesia for dental procedures. When he works with surgeons for other than dental procedures, the law might hold that the dental anesthesiologist is the agent of the surgeon. Nurses in the employ of a hospital are the agents of that hospital; but when working for physicians or dentists they become their agents. In private practice their position is precarious, unclear, and variable. The other less-qualified technicians are generally the agents of their employers. This résumé shows that legal responsibility for anesthetic practice varies widely with the personnel involved and with the community under consideration. It also implies that there is need for teamwork and understanding among all members of the dental and surgical operating teams to produce a smoothly functioning and safe procedure.

Scheduling of patients for operative procedures is an important step in their care. Usually the nurse in charge of the operative suite is responsible for arranging the schedule. A separate call to the anesthesiologist or head of the anesthesia service will coordinate the anesthetic problems easily.

■ *Necessity for General Anesthesia*

Certain factors and situations make general anesthesia advisable for hospitalized dental patients:[1] (1) mental retardation or handicaps among patients of all ages; (2) extensive need for fillings or extractions among children; (3) recalci-

trance of children and hysteria at any age, if the lack of cooperation precludes an office procedure with local anesthesia; (4) other requirements for surgery and general anesthesia that would permit dental work at the same time—such procedures as tonsillectomies and adenoidectomies, dilatations and curettages, revisions of certain fractures, and application of arch bars; (5) need for total gingivectomy; (6) requirements for adequate intraoral and extraoral roentgenography in studies of growth and development in the very young, in motion diseases such as parkinsonism in which the patient is unable to remain quiet for sufficient lengths of time, and in hysterical trismus that prevents cooperation; (7) fractures or tumors of the jaw; (8) need for oral or gingival biopsy; (9) sensitivity reactions to local anesthetics; (10) need of oral surgical procedures in adults whose physical status or surgical requirements preclude office correction with general anesthesia, and (11) specific diseases such as hemophilia and porphyria.

■ *Evaluation of Patients*

The problem of physical status is a significant one. Anesthesiologists have used widely a classification of physical states[2] into seven grades according to anesthetic risk as follows:

Grade I—No disease except surgical condition. No systemic disturbance.

Grade II—Moderate systemic disturbance from surgical condition or disease. (Examples would be mild endocrine or cardiac or respiratory disease with good physical adjustment and exercise tolerance; moderate anemia.)

Grade III—Severe systemic disturbance from disease or surgical condition. (Examples would be the more advanced forms of heart, lung, endocrine, renal, hepatic, or hematologic disease; electrolyte imbalances.) Usually patients with such conditions are receiving careful medical attention.

Grade IV — Disturbances that threaten life.

Grade V—Emergencies in Classes I and II.

Grade VI—Emergencies in Classes III and IV.

Grade VII—Moribund patients.

This classification emphasizes the significance accorded the preanesthetic evaluation of patients. Most dental patients fit into Grades I and II, that is, they have either no disease or well-compensated minimal disease. For this reason the experiences of the dental profession with general anesthesia for office practice have been eminently successful. Physical status of Grades III and IV certainly place patients among those requiring general anesthesia under hospital circumstances.

A classification of risk leads to consideration of the preanesthetic requirements of hospital practice. Most approved hospitals require some type of completed hospital record. Usually this includes a competently signed permission for surgery and anesthesia, a preoperative physical evaluation including a statement about the patient's suitability for general anesthesia, a record of the values from a determination of hemoglobin and urinalysis along with a chest roentgenogram if indicated, a record of the anesthetic and surgical procedure, and a brief postoperative note and sign-out diagnosis.

Written permission for anesthesia

and surgery should be mandatory in everyone's practice. Medical litigation increases continually, and safeguards such as signed permissions for anesthesia and surgery reduce the hazards of such litigation for all of us. Good taste and kindness require us to inform patients as fully as possible about the procedures contemplated. In the case of children or legally incompetent patients, this information would be directed toward the parents or guardian. Care should be taken to see that the person who gives the written permission is legally responsible for the welfare of the patient. Similar care should be taken to limit the procedures to those specified in the permission statement unless other measures are required to save life.

The preanesthetic evaluation is usually accomplished by the anesthesiologist on the basis of information furnished by the hospital records or by the patient's physician, supplemented by his preoperative visit with the patient. In the absence of a physician anesthesiologist, the determination of who is to perform the examination of dental patients must be worked out between the dental surgeon and the physician of the patient's choice. Such an evaluation should state clearly the condition of the heart and lungs, note allergies or previous anesthetic reactions, record all indicated laboratory work beyond the basic hemoglobin determination and urinalysis, and specify any limitations found in the ability of the patients to withstand anesthesia. The person administering anesthesia should be thoroughly familiar with the report and should conduct his work in accord with it so far as the patient's condition permits.

■ *Administration of Anesthesia*

Beyond any reasonable doubt, the widespread use of premedication has improved the quality of anesthesia.[3] Its general purpose is to decrease salivation, obtund pain, and produce tranquility without depressing vital respiratory and cardiac function. A major advantage for children is the lessening of psychic trauma associated with hospitalization and anesthesia. Many drugs have been added to the armamentarium in recent years, and a discussion of the details of premedication is beyond the sphere of this presentation. It is sufficient to say that the agents for premedication are selected individually on the basis of the age, weight and vigor of the patient, and are administered sufficiently in advance of the anesthetic to produce the desired pharmacologic effect.

Obviously patients scheduled for general anesthesia should be prevented from taking food or liquid for a number of hours preanesthetically to minimize the hazards of vomiting. In hospital practice, adults and children scheduled for morning surgery are usually given nothing by mouth after midnight; infants are given clear liquids until two to three hours before surgery. Afternoon patients may have a small liquid breakfast before assuming a "nothing-by-mouth" status until surgery. Accidental ingestion of food preoperatively increases the anesthetic risk significantly and is sufficient cause for delay or postponement of elective procedures.

The ideal anesthetic for general anesthesia would be nonexplosive, simply administered, analgesic, nontoxic in a wide range of concentrations, nonde-

pressant to vital functions, and suited to rapid induction and emergence. Unfortunately, no agent with all these advantages exists. Use of the intravenous barbiturates (supplemented with nitrous oxide and oxygen plus perhaps an opiate or trichloroethylene or halothane with or without a relaxant) has become fairly reliable in dental practice. This method uses intravenous, nonexplosive agents which provide controllable light general anesthesia plus inhalation analgesia and adequate oxygenation. Nasotracheal intubation easily controls the airway with a minimum of interference to the operator and an increase of safety to the patient. As a less elaborate method, nasal insufflation of oxygen and anesthetic gases is valuable. Generally, the smallest amount of anesthetic sufficient to obtund consciousness and relax the jaw for the procedure is all that is required. Such management shortens the recovery period and permits the patient to assume his own physiologic control at the earliest possible moment, thus reducing the need for postoperative care.

In most instances careful administration is the key to successful anesthesia in the presence of disease. Exceptions are patients who seem unsuited to barbiturates, specifically those patients having porphyria. Some authors counsel against the use of trichloroethylene in heart or liver disease, although it often has been used safely and effectively as an adjunct to nitrous oxide in the presence of these diseases.

Bleeding or contracted circulatory volume predisposes the patient to shock under anesthesia and indicates the necessity for the lightest planes of anesthesia with the greatest possible care. Severe degrees of head-up tilt also should be avoided to prevent inadequacy of blood flow to the brain. Respiratory diseases and cardiovascular diseases require care to maintain adequate ventilation, oxygenation, and blood pressure levels for successful anesthetic results. This care does not differ, however, from that needed for the simplest anesthetic in the most healthy patient.

Situations that decrease coagulation, such as hemophilia and anticoagulant therapy for cardiovascular patients, need specific care to prevent formation of massive hematomas. Injections should be avoided and gentle endotracheal manipulation assured, lest submucosal hemorrhage endanger the airway. Tumors of the jaw, fractures of the mandible and maxilla, and other conditions encroaching on the airway demand endotracheal intubation at the earliest moment to assure the safety of the patient. Usually intubation is best accomplished by the nasal route, and it may be carried out prior to induction in many instances.

Rectally administered anesthetics—thiopental (Pentothal) and tribromoethanol (Avertin)—have been used for induction in uncooperative children. This procedure is time-consuming, and the duration of anesthesia is often prolonged and unpredictable. However, this method is a valuable asset in hospital practice.

Much activity is being reported with a potent new inhalation agent named halothane (Fluothane). This nonexplosive halogenated hydrocarbon is analgesic in very small concentrations and is rapidly eliminated, but profoundly depresses respiration and circulation unless very carefully controlled. It has a definite place in the practice of anesthesia but

requires much more study prior to widespread acceptance as an agent for dental anesthesia except in expert hands. Halothane is like trichloroethylene, chloroform, and cyclopropane in that its sensitization of the myocardium to the presence of excess epinephrine can result in severe ventricular arrhythmias, precluding its use with solutions containing epinephrine for hemostasis. A technic of asphyxia with nitrous oxide and oxygen to which halothane is added has been described and good results have been indicated. In my opinion, however, such a technic would receive strong opposition from responsible anesthesiologists in this country and should be avoided lest the outcome be fatal.

■ *Limitations and Advantages of General Anesthesia*

It must be recognized that general anesthesia has definite limitations and disadvantages even in hospital practice.

1. The time consumed may be greater than with regional or local procedures.

2. The definite need to guard the airway of the anesthetized patient may hamper the operator who uses general anesthesia infrequently. Familiarity with the procedure and endotracheal intubation by the nasal rather than the oral route minimize this objection.

3. Occasionally, explosive anesthetics must be used for one reason or another. Therefore, the dental equipment must be free from electric sparks or open flames at all times, and good principles of operating room safety must be practiced constantly.

4. The use of epinephrine in injected solutions for purposes of vasoconstriction must be carefully coordinated with the anesthetic agent. As mentioned previously, excess epinephrine produces arrhythmias in hearts sensitized by trichloroethylene, halothane, chloroform, or cyclopropane. Ether and thiopental-nitrous oxide-opiate mixtures do not have this hazard.

5. A recovery period with careful watching must be anticipated with use of any general anesthetic. Powerful suction and means to treat respiratory insufficiency and vascular collapse are required also wherever anesthesia of any kind is administered.

6. Finally, general anesthesia and hospitalization constitute an additional financial burden to the patient.

Despite these limitations, the advantages of general anesthesia and hospitalization are displayed by the list of patients on whom dental procedures can best be performed by this means. Without such facilities these people would be inadequately tended by the dental profession. It is apparent, therefore, that a requirement exists for the increased use of hospital facilities for general anesthesia by dentists in all communities. Hospital practice is different from office practice; but although it has requirements peculiar to itself, these requirements are designed to facilitate the ease and safety of patient care for all of us. Once understood they pose no problem.

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VOLUME 19 • JANUARY 1961 • NUMBER 1 CASE REPORTS

Mixed tumor of the submandibular space: *report of case*

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Although mixed tumors have been reported in almost all of the associated structures of the mouth, the majority have been found in the major salivary glands, lips and hard palate.

Ash[1] reported 683 cases of mixed tumors with the following distribution: parotid gland, 503; submaxillary gland, 55; sublingual gland, 2; lip, 40; palate, 80, and tongue, 3.

The case to be reported is of interest because of the size and unusual location of the tumor.

CASE REPORT—On October 5, 1959, a 45 year old white man reported to the U. S. Naval Hospital, Jacksonville, Fla. He was referred from an outlying clinic with an asymptomatic swelling in the region of the submandibular gland, which first became noticeable approximately six months prior to admission. The patient had no associated fever, chills or pain. The swelling had slowly increased in size since time of onset.

EXAMINATION—The general physical examination was within normal limits with the exception of findings relative to the right submandibular region. Extraoral examination revealed a large, extremely mobile, nontender mass approximately 4.0 cm. in diameter in the region of the right submandibular gland (Fig. 1). The general oral condition was excellent. Sialograms of the right submandibular gland appeared within normal limits, and no abnormality of Wharton's duct was noted. Serologic reactions were negative. The leukocyte count was reported as 7,200 with a differential count of 73 neutrophils, 23 lymphocytes, 2 monocytes, and 2 eosinophils. Hemoglobin was 14.2 Gm. and hematocrit, 44. Urinalysis was reported negative.

OPERATION—The operation was performed on October 8, 1959, with the patient under local anesthesia. An incision was made in the right side of the floor of the mouth beginning 2.0 cm. posterior to the salivary caruncle and extending laterally to Wharton's duct, approximately 6.0 cm. in an anteroposterior direction. By sharp and blunt dissection a yellow, encapsulated mass, approximately 3.5 cm. by 3.0 cm., was exposed and enucleated intact (Fig. 2). No connection with the submandibular gland was discernible. The deep layers of the operative wound were approximated with catgut sutures and the mucosa closed with no. 0000 interrupted silk sutures.

PROGRESS—Postoperative medication consisted of meperidine (Demerol) 50 mg. every four hours for pain and one buccal strepto-

Fig. 1—Appearance of submandibular swelling at time of admission of patient to hospital

Fig. 2—Delivery of mixed tumor through incision in floor of mouth

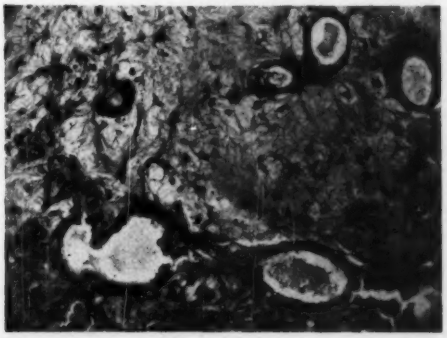

Fig. 3—Left: Photomicrograph of tumor showing variation from loosely arranged myxomatous tissue to dense hyalinized fibrous component. Right: View showing ductlike structures of tumor

kinase-streptodornase (Varidase) tablet dissolved in the mouth four times a day. A liquid diet was ordered. A moderate amount of submandibular edema was present for the first three postoperative days, but convalescence was uneventful. Sutures were removed on October 12, the edema was reduced and the patient was asymptomatic. By October 14, healing was complete and the patient was discharged to duty with instructions to return in three months. The submandibular gland functioned normally.

PATHOLOGIC EXAMINATION—The specimen was reported by H. H. Scofield, Commander, Dental Corps, U. S. Navy, as a benign mixed tumor, salivary gland type, submandibular space. The report is quoted:

"Gross: The specimen consists of a smooth, firm, oval, somewhat bosselated, yellowish-white to a bluish-brown mass measuring 3.5 by 3.2 by 2.2 cm. The specimen cuts with some grittiness and the cut surface presents a dull, white, homogeneous appearance.

"Microscopic: Examination of sections taken through three different areas of the specimen reveals that it is a benign mixed tumor of the salivary gland type. The lesion is surrounded by a thin but well-defined capsule of compressed fibrous connective tissue. The connective tissue component of the tumor varies from areas of loosely arranged, myxomatous appearing tissue, through areas of dense, hyalinized fibrous connective tissue, to areas resembling pseudocartilage. For the most part the epithelial component consists of round, spindle and oval shaped cells which are relatively uniform in size, shape and staining quality, and are arranged in thin strands, nests and ductlike structures. In one section the tumor is composed of a fairly solidly packed mass of ductlike structures lined by cells with large, vesicular nuclei containing rather prominent nucleoli. Special staining reveals mucin throughout most areas of the tumor. There is no evidence of malignancy" (Fig. 3).

"The diagnosis is benign mixed tumor, salivary gland type, submandibular space."

COMMENTS—In this case, pronounced mobility and the relative ease with which the tumor was enucleated suggested a probable benign growth. The possibility of local recurrence must be considered. McFarland[2] reported that the usual time interval before recurrence is approximately seven years.

The growth was located in the submandibular space—a relatively unusual location. Such a lesion may be erroneously diagnosed preoperatively as a chronic submandibular sialadenitis or tumor of the submandibular gland.—*413 Saddle Rock Road.*

The opinions or assertions contained in this article are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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■ Spirit of Progress

Through some manner of alchemy at all levels of society, there must be a cultivation of a taste for learning, for scholarship, and for all that is excellent in mind and spirit.—*J. A. Stratton.*

Cherubism: *report of three cases*

■ *Fletcher S. Abbey,* D.D.S., M.S., San Francisco, and*
C. Herman Reece,† D.D.S., Oklahoma City

The familial occurrence of bilateral, firm and painless enlargement of the jaws was first reported by Jones[1] in 1933 as "familial multilocular cystic disease of the jaws." The most recent report of the same condition was published in 1958 by Small and Young[2] as "familial osseous dysplasia." Other reports during this time have designated the condition as "familial bilateral giant cell tumors,"[3] "familial fibrous swelling of the jaws,"[4] and "familial intraosseous fibrous swellings of the jaws."[5] "Cherubism," the term often used to describe this entity clinically, was coined by Jones in 1933.

Since several different terms have been used for the same abnormality, the histopathological slides and case history of our first case were sent to Joseph Bernier and Charles Waldron for their evaluation and diagnosis. This was done with the thought of trying to standardize the terminology for this condition. It is interesting to note that both oral pathologists felt that the condition could be diagnosed best as cherubism.[6,7]

Cherubism is a familial disease that is limited to children with no predominant differences of occurrence between boys and girls. It has not been found to be present at birth but becomes apparent when the child is around two years of age or shortly thereafter. The disease is not painful and the involved regions are nontender with a bilateral "fat face" being the usual complaint. According to Caffey and Williams,[4] the jaws expand most rapidly during the first year or two after onset, and the most striking facial deformities are seen near the end of this period of rapid expansion. During the next five years the disorder remains quiescent or progresses slowly. With puberty there is a decided clinical improvement in facial appearance although roentgenographically no decrease in jaw expansion is noted. Caffey and Williams state further that after puberty there is a progressive improvement in facial appearance, and by middle age the facies has usually returned to normal.

The body of the mandible is the region involved most often, always bilaterally. The alveolar processes may show decided medial and lateral expansion resulting not only in facial deformity, but causing an elevation of the tongue with a resultant speech defect.[4]

The maxilla may or may not be involved, but when it is, the lesion generally is limited to the tuberosities.[5] If the involvement is bilaterally extensive, a v-shaped palate may result.

Roentgenographically, the mandible generally is characterized by numerous multilocular cystlike areas of radiolucency, and in many areas only a few bony septums are visible. There appears to be considerable expansion with a resulting thin cortex. The teeth are often ectopic and frequently are absent. If the maxilla is involved, generally there is a more diffuse radiolucency than in the mandible, and the maxillary margins are ill-defined. Also, there tends to be a less apparent displacement of teeth than usually seen in the mandible.

In establishing a diagnosis for this disease, such conditions as hyperparathyroidism,

ameloblastoma, central giant cell tumor, fibrous dysplasia, and odontogenic cysts must be considered.[2] Although bilateral occurrence should at least suggest cherubism, odontogenic cysts and giant cell tumors are known to occur bilaterally.[8,9] Therefore, to arrive at a correct diagnosis, a biopsy is imperative along with a complete history and physical examination.

To date, the form of treatment most commonly employed for this abnormality has been curettage. There has been some question as to the feasibility of surgical intervention because of the potential for spontaneous regression of this condition in older persons as suggested by Caffey and Williams. However, the psychological effect of this condition during a child's formative years sometimes appears to more than justify surgical treatment. A good example of how socially unacceptable the facial appearance may become if the condition is untreated was illustrated in a report by Jones and co-workers[10] in 1950, and reiterated by Bruce and co-workers[5] in 1953. Jones observed continuing distorted facial features produced by this disease entity in three siblings, ranging in age from 15 to 17 years, who had been followed since childhood. They concluded that surgical curettement was indicated. A comparison of the preoperative and postoperative photographs and roentgenograms indicated a great improvement was obtained in all three siblings.

This paper reports three new cases of cherubism that were seen in the oral surgery clinic of the University of Oklahoma Medical Center.

CASE 1—On February 28, 1958 (Fig. 1), a six year old white boy came to the oral surgery clinic for consultation because of bilateral enlargement of the mandible. The mother had been aware of his unusually "fat face" for several years. However, the maternal grandfather was the first to suggest that the boy might need treatment. The patient was then seen by his local physician who referred him to the University Hospital for diagnosis and treatment.

The patient was one of two siblings. His brother, aged seven, also had bilateral enlargement of the mandible (Case 2). The mother, aged 27, and the father, aged 33, denied a history of a similar condition. Roentgenograms of the two revealed no abnormalities of the jaws. The maternal grandfather gave a positive history of the condition (Case 3).

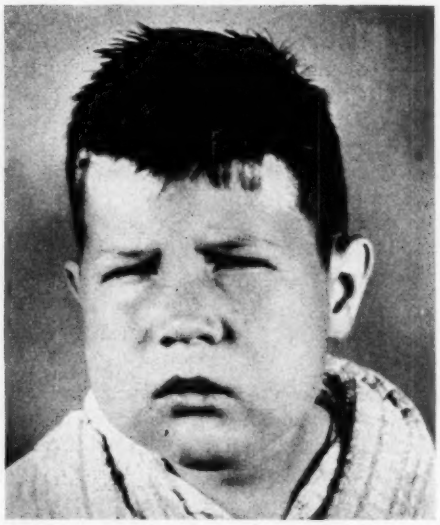

Fig. 1—Case 1. Preoperative view showing bilateral mandibular expansion

A history and physical examination of the patient, except for the orofacial region, was essentially negative. The mother had had a full-term pregnancy with the child who had weighed 7 lbs., 8 ozs. at birth. He appeared to be a well-nourished, bright, active youngster. His face was bilaterally full. Palpation revealed a smooth, firm, nontender, overgrowth on both sides of the maxilla and mandible. There was discernible lymphadenopathy in both the right and left submandibular regions.

Oral examination revealed the presence of bilateral, firm, nontender masses in the mandibular molar regions. The alveolar processes were expanded buccally about 2 cm. Also, in the mandibular anterior region there was extensive lingual expansion from the right to the left deciduous cuspids. The maxillary right

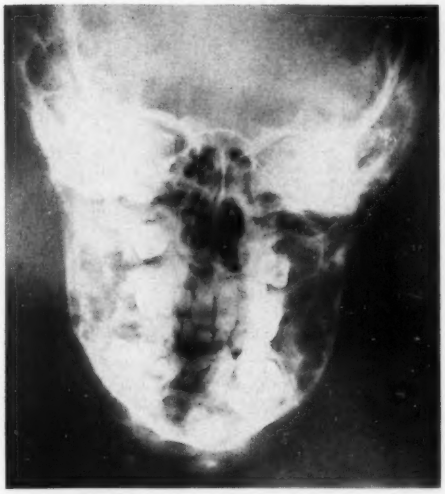

Fig. 2—Case 1. Preoperative posteroanterior roentgenogram revealing multilocular bilateral expansion of mandible

and left tuberosities were both expanded buccally beginning in the second deciduous molar regions. The following teeth were present in the upper jaw, the deciduous central and lateral incisors, cuspids, and first and second molars; in the lower jaw, the permanent central incisors and the deciduous cuspids and first and second molars. The mandibular permanent incisors were the only teeth in malalignment.

Laboratory examination showed the complete blood count and urinalysis to be within normal limits. The serum calcium was 10.5 mg. per cent (normal 9.5 to 11.5); serum phosphorous 7.1 mg. per cent (normal 4 to 6.5); and the alkaline phosphatase was 8.65 Bessey-Lowry units (normal 2.8 to 6.7). The somewhat elevated alkaline phosphatase level observed in this patient might be related to the activity of his osteolytic lesion, but inasmuch as it was so close to normal it is doubtful if any clinical significance should be inferred. However, these findings suggest that future attempts to correlate the serum phosphatase levels with the clinical course of the disease might demonstrate that the blood level of this enzyme is indicative of the activity of the pathological process.

Roentgenograms of the mandible (Fig. 2) revealed extensive radiolucency and cystlike compartments extending from the right to the left side of the mandible and involving the

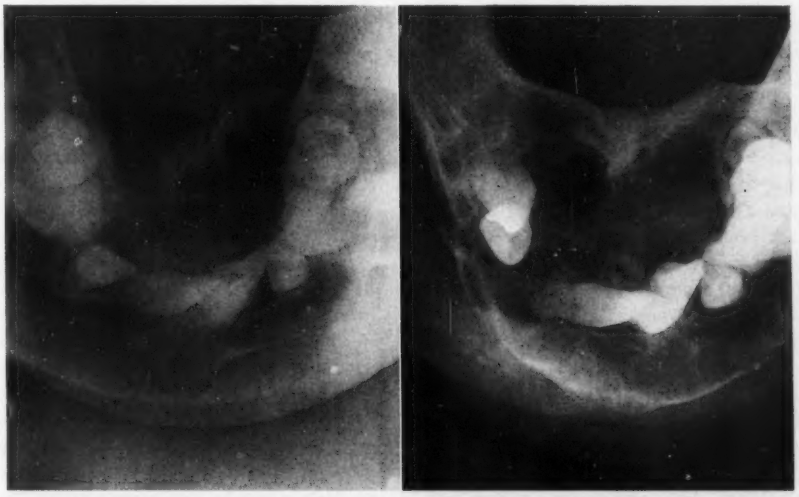

Fig. 3—Case 1. Left: Occlusal view showing extensive lingual expansion in symphysis region. Right: Occlusal view 15 months later showing increased labial expansion

sigmoid notches on both sides. These roentgenograms revealed no evidence of second or third molar tooth buds and the remaining unerupted permanent teeth were very ectopic. The occlusal roentgenogram (Fig. 3, left) revealed extensive lingual expansion in the symphysis region and almost complete absence of any cortical bone. The skeletal survey was reported as negative.

FIRST OPERATION—On March 6, 1958 under nitrous oxide, oxygen and trichloroethylene nasotracheal anesthesia, the patient was prepared for surgery. An intraoral incision was started at the height of the right ascending ramus and carried down through the retromolar region, along the crest of the alveolar ridge, around the necks of the first and second deciduous molars and then vertically into the mucobuccal fold. The mucoperiosteal flap was then reflected exposing a large reddish brown nonencapsulated tumor mass. A representative section was secured for frozen section. This was reported as a benign fibro-osseous lesion of the bone. Large bowl curets were used to remove the tumor in multiple pieces. Included in portions of the tumor were the permanent bicuspids and first molar. The second deciduous molar was also removed. The tumor appeared to involve the entire ascending ramus except for the condyle and posterior border. The tumor mass was removed in its entirety by extensive curettement as far as it was clinically possible to ascertain. Several cyst-like compartments were encountered. After smoothing the rough edges of the buccal cortical plate, a saturated solution of zinc chloride on cotton applicators was applied to the exposed bone in an effort to destroy the tumor tissue cells that were not removed. The region was irrigated with a normal saline solution and then an iodoform gauze dressing saturated with balsum of Peru and castor oil was inserted into the bony defect. Sutures were placed to maintain the dressing in position. The patient tolerated the entire procedure well. During the course of the operation he was given one unit of whole blood. The postoperative course was uneventful.

Roentgenograms taken 15 months after the operation, in June, 1959 (Fig. 4), revealed that satisfactory healing had taken place and that the surgical defect had filled with normal appearing bone. Clinically the right side of the patient's face appeared "normal" (Fig. 5, left). Both the patient and his parents were pleased with the results and requested that a second operation be performed on the left side.

Fig. 4—Case 1. Posteroanterior view revealing satisfactory healing 15 months after surgery on right side of mandible

Oral examination at this time revealed that as before, both the right and left maxillary tuberosities were expanded buccally. In addition, there was lingual expansion on the right side to the palatal midline. Roentgenographic examination of the maxillary teeth revealed that the right second permanent molar was in a malposition over the roots of the first molar which had erupted. Also, there was no evidence of the maxillary left second and third molars, or of the right third molar. The edentulous operated site of the mandible had completely healed. The unoperated portion of the mandible was essentially the same as when the patient was first seen, except there was much more labial expansion in the symphysis region as seen in Figure 3, right.

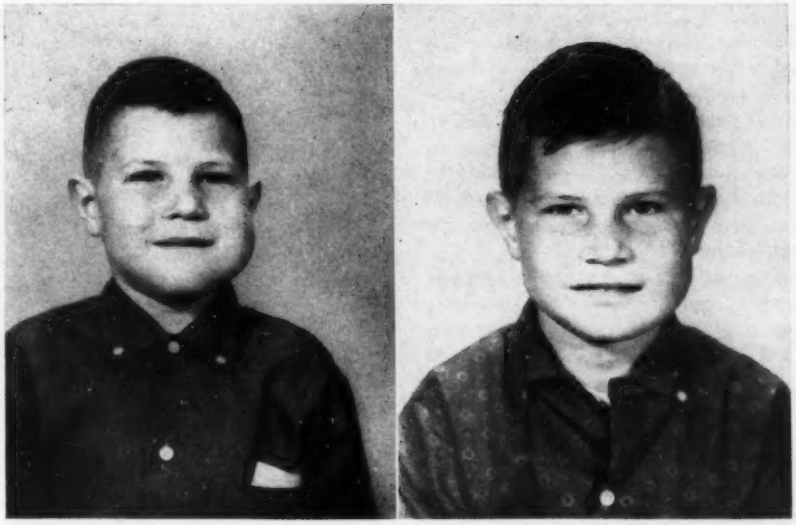

Fig. 5—Case 1. Left: Appearance 15 months after surgery on right side of mandible. Right: Appearance four months after second operation

SECOND OPERATION—On July 23, 1959 under halothane, nitrous oxide and oxygen nasotracheal anesthesia, the patient was again prepared for surgery. The same procedure was used as before. However, this time the incision was started about the height of the left ascending ramus and carried down through the retromolar region along the height of the alveolar ridge, around the necks of the teeth to the right deciduous first molar and then vertically into the mucobuccal fold. The same situation was encountered as previously described and a similar surgical procedure was carried out. All remaining teeth and permanent tooth buds were involved in the tumor mass and were removed leaving the mandible completely edentulous. The patient again tolerated the entire procedure well.

The pathologist's reports were similar for both operations. The specimen removed during the second operation revealed a proliferation of fibrous connective tissue which formed interlacing bands. Long spindle-shaped cells with fairly prominent nuclei were present. In places these cells interlaced. The vascular structure was rather rich. Scattered throughout the specimen many mononucleated giant cells with fairly small regular nuclei were noted. Adjacent to many of the giant cells throughout the specimen were fine brown granules of hemosiderin. In addition, many vacuolated cells which appeared to contain fat were found. A few small spicules of mature and well-developed bone were also noted.

The postoperative course of this patient has been uneventful. The surgical defect has granulated nicely. The patient's appearance is acceptable (Fig. 5, right) and both the patient and his parents are pleased with the results. The patient is now having a lower denture constructed.

CASE 2—On March 17, 1958 the seven year old brother of Case 1 appeared at the oral surgery clinic for consultation because it was thought that he might have a condition similar to that of his brother.

A history and physical examination of the patient, except for the orofacial region, was essentially negative. As with the first, the

mother had had a full term pregnancy. The child had always enjoyed good health and he appeared well-nourished and well-developed. His facial appearance, although not displeasing, was bilaterally full in the molar regions giving a "chipmunk" or "fat face" appearance. There were palpable lymph nodes in both the right and left submandibular regions.

Oral examination revealed that both the right and left mandibular alveolar ridges were expanded buccally beginning in the first permanent molar region and extending distally to the coronoid processes. The masses were nontender and very firm. The maxillary right and left tuberosities were both expanded buccally. The right maxillary expansion started in the second deciduous molar region whereas on the left it was noted distal to the first permanent molar. The following teeth were present: in the upper jaw, the permanent central incisors and first molars and the deciduous lateral incisors, cuspids and first and second molars; in the lower jaw, the permanent central and lateral incisors and first molars and the deciduous cuspids and first and second molars. With the exception of the mandibular right first molar which was rotated about 90 degrees, all teeth were in good alignment.

A roentgenographic examination, which included a skeletal survey, was reported normal except for the maxilla and mandible. The films (Fig. 6) revealed bilateral multicystic lesions of the mandible extending from the first molar region to and including the ramus. The cyst-like areas were also seen in the maxillary tuberosity regions. There was no evidence of any maxillary or mandibular second or third molar tooth buds on the left. However, there was a second molar in both the maxilla and mandible on the right. Both teeth were ectopically placed, ruling out a chance for normal eruption.

On laboratory examination the blood count and urinalysis were within normal limits. The serum calcium was 9.7 mg. per cent; serum phosphorus 5.4 mg. per cent; and the alkaline phosphatase 6.35 Bessey-Lowry units.

On July 10, 1958 under thiopental sodium, nitrous oxide and oxygen nasotracheal anesthesia, the patient was prepared for surgery. Representative material was taken from the

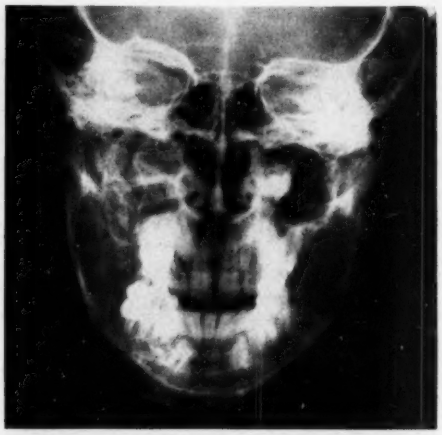

Fig. 6—Case 2. Posteroanterior view showing bilateral multicystic areas

right maxillary tuberosity region and the mandibular right molar region for pathological evaluation. Also, the maxillary right second permanent molar was removed. The patient tolerated the entire procedure well and healing of the biopsy sites was uneventful.

Histological evaluation of the excised tissue from the maxilla and mandible showed essentially the same microscopic picture. The report stated they were predominantly of mature fibrous connective tissue which was well vascularized. There were broad sheets of spindle-shaped cells which seemed to surround smaller regions of mononucleated giant cells. In other regions small mature bone spicules were present. The biopsy report was "benign fibro-osseous lesion of the maxilla and mandible."

Because the facial appearance of this patient is considered good no corrective surgery is contemplated. The patient will be watched for future facial growth changes.

CASE 3—The 53 year old maternal grandfather of Case 1 and 2 was seen in the oral surgery clinic in September, 1959.

The patient, one of five siblings, stated that as a child he had had a condition similar to that of his grandsons. Neither his parents nor any of his brothers or sisters had the ab-

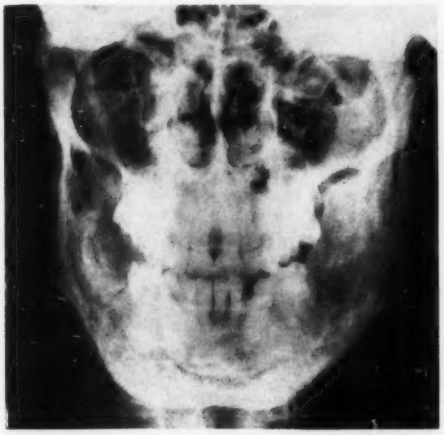

Fig. 7—Case 3. Posteroanterior view of maternal grandfather at age 53. Note large mandible and irregular bony pattern

normality. He stated his bilateral facial swelling was first noticeable to his parents when he was about three years of age. At seven years of age his swelling had increased to the extent that surgery was performed. An extraoral approach was used bilaterally as evidenced by his present facial scars.

Oral examination revealed the presence of the following teeth: in the upper jaw, on the right side, the central and lateral incisors, cuspid, bicuspids and first and second molars; on the left, the central and lateral incisors, cuspid, bicuspids and second and third molars; in the lower jaw, the central and lateral incisors, cuspids, second bicuspids and second molars. Both the position and alignment of the teeth were satisfactory. The patient did not recall whether the mandibular third molars had been extracted or failed to erupt. Both the maxillary and mandibular alveolar ridges appeared rather large. However, there was no definite buccal or lingual expansion.

Roentgenograms of the jaws (Fig. 7) revealed a mandible rather large in all dimensions. The bony trabecular pattern appeared somewhat irregular, particularly in the left molar and ramus areas. There was some increased radiolucency. There was no evidence of the mandibular third molars.

Clinically the patient's facial appearance was symmetrical. He appeared to have a satisfactory result from his corrective surgery both clinically and roentgenographically.

Since reports on biopsy specimens taken at the time of his surgery are not available, a definite diagnosis of cherubism cannot be established. However, his history and early photographs give much support to this diagnosis.

SUMMARY—Three instances of familial bilateral enlargement of the jaws, occurring in the same family over three generations, have been reported. In the past, several different terms have been used to describe this abnormality. For this reason the histopathological slides and history of Case 1 were sent to two recognized oral pathologists for their thinking concerning the most appropriate diagnostic term. Both doctors felt that the term "cherubism" is probably best for this disease entity.

To date the treatment most commonly employed has been intraoral curettage. The practicability of surgical intervention has been questioned because of the potential for spontaneous regression of this condition in older persons. In certain patients in whom the appearance becomes objectionable and may create a psychological problem for the patient, surgical intervention seems indicated. In other instances where there is some alteration in facial outline but the over-all appearance remains satisfactory, surgical intervention appears contraindicated. Of course these patients should be followed to note any further abnormal development.—*450 Sutter Street.*

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Surgical correction of macrocheilia: *report of case*

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Macrocheilia is defined as an enlargement, hyperplasia or hypertrophy of the lip. The manifestation of an increase in the size of the lips may be a sign of a variety of diseases, conditions and syndromes.[1-8] Acute macrocheilia which occurs in a matter of a few minutes or days usually is the result of infection, angioneurotic edema, trauma or insect bite. Chronic macrocheilia develops over a much longer period. The chronic form of lip enlargement can be divided into hereditary types and acquired types which may be caused by neoplasms, hyperplasia of the labial salivary glands, facial palsy and certain systemic diseases. Enlargement of the lips also is associated with Asher's syndrome and the Melkersson-Rosenthal syndrome.

The specific cause of the lip enlargement usually can be determined by a thorough history, an oral and physical examination and various laboratory procedures with or without a biopsy. In instances of macrocheilia resulting from infection, the evaluation of the signs and symptoms of inflammation, the hemogram and certain bacteriological studies such as cultures of microorganisms of a possible exudate, the serological test for syphilis, and the tuberculin test are of value in establishing the causative pathogen. The history is of paramount importance in determining whether the condition is hereditary or acquired, the result of trauma or an insect bite.

A biopsy is essential in establishing a diagnosis of neoplasm or hyperplasia of the lip. The physical examination, basal metabolism and studies of the function of specific ductless glands are of assistance in differentiating changes in the size of the lips stimulated by endocrine gland disturbances.

As in any pathologic process, the first step in the treatment of macrocheilia is the correction or removal of the causative factor. Other measures are occasionally necessary to correct enlargements of the lips which persist after the underlying cause has been removed. Roentgen-ray therapy, the injection of boiling water in the lips, and surgery are methods that have been described as useful in the treatment of macrocheilia.[1,3,9]

CASE REPORT—A Negro man, age 66 years, was seen in the dental service, Veterans Administration Hospital, Tuskegee, Ala., for routine dental examination. The patient's chief complaint was missing teeth which had been extracted because of a periodontal condition. The patient stated that his lips had been unusually large all his life. Of a family consisting

Fig. 1—Left: Preoperative view showing macrocheilia of the lips. Right: Surgical correction of lower lip

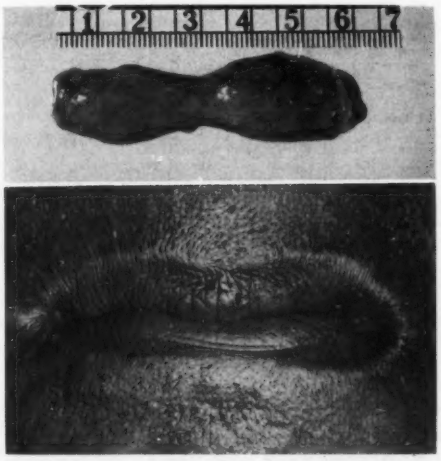

Fig. 2—Above: Specimen of lower lip. Below: Postoperative view showing improved appearance

of two sisters and four brothers, one sister had lips which resembled his in size and shape.

CLINICAL EXAMINATION—The oral examination revealed the upper and lower lips to be greatly enlarged (Fig. 1, left). The enlargement was more obvious when the patient talked or smiled. The inner segment of the lip was larger than the extraoral portion and was indented in the midline, producing the appearance of a double lip. Palpation of the lips revealed them to be smooth and soft in consistency. The patient was edentulous. The tongue was slightly enlarged, but was of normal color, shape and consistency.

The tentative oral diagnosis was hereditary macrocheilia of the upper and lower lips.

OPERATION—With the patient under local nerve block anesthesia produced by injection of a 2 per cent lidocaine-epinephrine solution, a cheiloplasty of the upper lip was performed. An elliptical section of the lip was excised along the entire length of the junction of the intraoral and extraoral surfaces. Dissection was extended down to the orbicularis oris muscle. The bleeding vessels were ligated with plain catgut sutures. The deep tissues were approximated with several no. 0000 plain catgut sutures to minimize the space produced by the excision, and the mucosa was approximated in the usual fashion (Fig. 1, right). A total of 300 TR units of hyaluronidase in 1 cc. of normal saline solution was injected in various sites along the labial fornix. An extraoral pressure bandage was applied to the upper lip.

A similar cheiloplasty of the lower lip was performed ten days later.

PATHOLOGIC FINDINGS—The gross specimens (Fig. 2, above) consisted of two pieces of elliptical shaped tissue which measured 5 by 1.5 by 1 cm. and 4.5 by 1.6 by 1 cm. each. The submucosa was pinkish-white, soft and contained a number of small ovoid masses

measuring about 3 mm. in diameter. Transverse and longitudinal sections were taken for microscopic study.

Microscopic examination of sections of the specimen showed a large collection of serous glands which formed varying sized adenomatous masses in the subepithelial stroma. The stratified squamous epithelium was focally atrophic.

The diagnosis was adenomatous hyperplasia of upper and lower lips.

POSTOPERATIVE COURSE—On the first postoperative day there was no appreciable swelling of the upper lip. The lower lip, however, had considerably more swelling than the upper lip. The sutures were removed on the fifth postoperative day, and the recovery of the patient was uneventful. Final examination after healing was complete revealed that the surgical procedures had produced the desired improvement in the appearance of the lips (Fig. 2, below).

COMMENT—Postoperative edema is the main problem associated with such operations. It is believed that the local injection of hyaluronidase, the pressure bandage and the submucosal sutures were significant factors in minimizing the edema observed in this case.

*Oral surgeon, Veterans Administration Hospital.

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Intraoral one-stage ostectomy for correction of mandibular prognathism: *report of case*

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The surgical treatment of mandibular prognathism has been an accepted procedure for many years. Its aim is to improve the external appearance of the patient and to give better masticatory function of the teeth. There is considerable difference of opinion, however, regarding the type of operative procedure to be used in order to achieve the desired results. Numerous operative approaches have been described and discussed in the literature during the past ten years. Many of these differ only by some minor modification of a previously described technic. Each author has presented the indications for the operation of his choice. Some authors believe that their procedure covers all conditions and that there should be only one procedure of choice. Extensive clinical experience dictates that the varied anatomic states require varied approaches.

In the final analysis, function and muscle balance of the masticatory apparatus must receive the basic consideration with the esthetic results as secondary.

Unfortunately many patients have been

operated on in whom little consideration was given to function and invariably the results are questionable and the benefit to the patient nonexistent or minimal at best.

It is apparent that no single procedure is applicable for the surgical correction of all types of mandibular deformities. Each patient should be thoroughly evaluated preoperatively to determine the most efficacious procedure. This evaluation should include the following procedures:

1. The existing teeth should be examined and those which are decayed or severely malposed should be restored or extracted.

2. Casts of the upper and lower teeth should be mounted on an articulator and adjusted to the position that will give maximum occlusal contact. If it is decided to remove a section of the body of the mandible, the exact measurements of the section of bone to be removed can be determined on the casts. These measurements may show that more bone should be removed from one side than the other.

3. Adequate means of postoperative immobilization should be prepared; this step cannot be overemphasized. The immobilization must be sufficient to counteract all muscle pull.

4. Roentgenograms should be made of the teeth and jaws; they are an important aid in the determination of the type of operation to be performed. Soft tissue profile roentgenograms also can be helpful to estimate the amount of bone to be removed. These roentgenograms can be divided through the lip line and repositioned at the optimum position for esthetic improvement. If the findings in the roentgenograms vary from the measurements on the stone models, it must be decided whether improved esthetics or occlusal function is the primary objective.

5. Photographs should be taken for the record.

6. If an ostectomy is decided on, a clinical evaluation should be made to determine whether adequate access is available for a one stage intraoral approach.

REPORT OF CASE—A 23 year old woman, a civilian dependent, was referred to this facility on January 29, 1959 for evaluation and treatment of severe mandibular prognathism.

The preoperative evaluation and treatment were done on an outpatient basis. The patient was referred to the departments of orthodontics and prosthodontics for their examination and evaluation. Subsequently several consultations were held to outline and carry out the treatment by the three departments.

Fig. 1—Preoperative right lateral jaw roentgenogram

Complete mouth, posteroanterior, right and left lateral oblique, and cephalometric roentgenograms were taken (Fig. 1). Maxillary and mandibular study models were made and mounted on an articulator.

Oral and study model examination revealed severe prognathism and malocclusion with the mandibular teeth in complete labioversion to the maxillary teeth, and considerable deformity of the facial profile (Fig. 2). All teeth were present except the lower left and both upper third molars. The upper left second molar was severely malposed in buccoversion with no occlusal contact; therefore, it was extracted under local anesthesia.

Further study models were made, duplicated, and checked for the desired postoperative occlusion. No occlusal harmony could be obtained by moving the entire mandible posteriorly; therefore, all surgical approaches involving the ascending ramus were ruled out. Cuts were made in the mandibular models by trial and error, first removing the lower first bicuspids, then the second bicuspids, and finally the first molars. This revealed that excellent occlusion could be obtained by removal of the second bicuspid bilaterally. This, however, would leave minimal room for deviation in the sectioning of the mandible; otherwise the roots of the adjacent

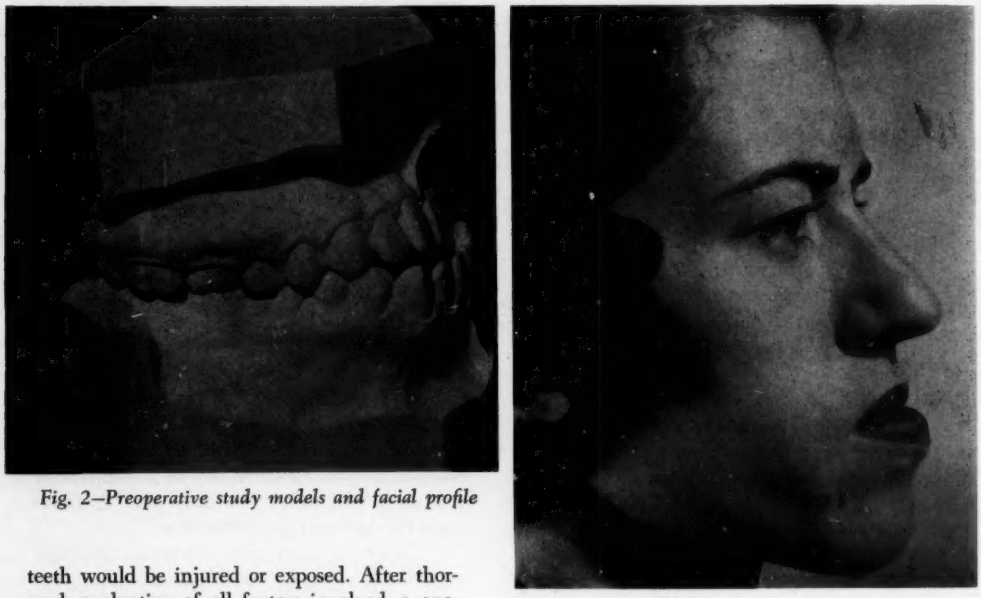

Fig. 2—Preoperative study models and facial profile

teeth would be injured or exposed. After thorough evaluation of all factors involved, a one-stage intraoral bilateral ostectomy of the body of the mandible through the second bicuspid site was selected as the procedure of choice.

As determined by the sectioned models, the size of the wedge of bone to be removed on the right was 7 mm. at the alveolar crest and 3 mm. at the inferior border of the mandible. The left side was slightly smaller, measuring 6 mm. at the crest and 2.5 mm. at the inferior border. These measurements were approximately 2 mm. less than the amount of bone removal necessary for maximum esthetic result as determined by repositioning the roentgenogram of the soft tissue profile. This deviation was not considered significant; therefore, the occlusion was given precedence.

The models were then placed in the postoperative occlusion, secured with wax, and were duplicated in this position to permit construction of labial arch bars which would be applied at the time of surgery.

The patient was returned to the consulting orthodontist for placement of individual bands, and labial edgewise arch bars with attachments for intermaxillary fixation. The patient was treated by the orthodontist for approximately eight weeks for minor occlusal adjustments and improved buccal alignment to facilitate easier application of the labial arch bars at the time of surgery.

COURSE IN THE HOSPITAL—The patient was admitted to the USAF Hospital, Lackland, Texas, on April 20, 1959 for the surgical procedure.

Past history and systems review were negative or noncontributory. The physical examination was essentially negative except for the previously mentioned prognathism with the secondary malocclusion. Routine urinalysis, hematology and chest roentgenograms were negative or within normal limits.

OPERATION—On April 21, under nasotracheal anesthesia, the patient was prepared and draped in the usual manner. A posterior pharyngeal pack was placed around the endotracheal tube, and the surgical sites were infiltrated with lidocaine-epinephrine solution for hemostasis.

Buccal and lingual mucoperiosteal flaps

were reflected inferiorly from the free gingival margins to the inferior border of the mandible. Two vertical relaxing incisions were made, one at the distal of the right first molar and the other at the mesial of the right cuspid. To permit adequate reflection of the buccal mucoperiosteal flap, the mental nerve was sacrificed at the mental foramen. The mandibular right second bicuspid was then extracted.

Measurements of the bone were established and recorded by marking the bone with a sharp scalpel. The marked wedge of mandible was then resected with a Stryker orthopedic bone saw. Sterile saline solution was sprayed on the incision during the cutting procedure for reduction of heat.

Then one hole was drilled in both the anterior and posterior segments, 22 mm. from the crest of the first molar cusp. This distance was predetermined as a safe point to avoid injury to the apexes of the teeth or entry into the mandibular canal. A transosseous stainless steel wire, .018 inch, was passed through these holes and then was twisted in a semifixed position.

A similar procedure was carried out on the left side. The only variable was the size of the resected bone wedge.

The anterior segment was manipulated into position and the occlusion was noted to be excellent. Also there was good coaptation of the segments buccolingually as well as vertically. Then the special labial edgewise arch bar was applied and ligated to each tooth in the arch at the labial bracket by the orthodontist. Intermaxillary elastics were applied and the occlusion in the new position adjusted to the desired position. The transosseous wiring was then tightened bilaterally to the indicated state of tension and stability. Excellent stabilization of the entire mandible was achieved by the combined use of the edgewise arch bar and the transosseous wire through the body of the mandible. The elastic bands were removed and the mucoperiosteal flaps were returned to position, trimmed and sutured with no. 00 black silk interrupted sutures. The pharyngeal pack was removed and intermaxillary immobilization reaccomplished with elastic bands. The patient tolerated the procedure well and was returned to the recovery room awake and in good condition.

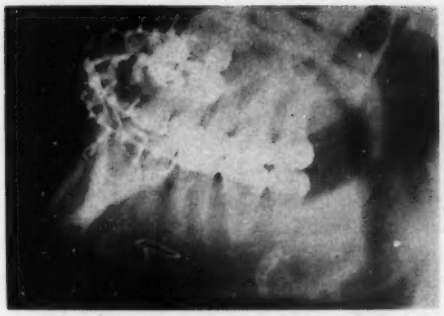

Fig. 3—First postoperative right lateral jaw view

POSTOPERATIVE COURSE—The edema after the surgical procedure was minimal and confined largely to the lips. The patient was given penicillin 600,000 units, streptomycin 0.5 Gm. twice a day, and diphenhydramine hydrochloride, 50 mg. every four hours, until discharged on the tenth postoperative day. There was postoperative anesthesia of the mental region bilaterally, but the patient was aware of some return of sensation by the seventh postoperative day.

The intermaxillary elastic bands were changed to size 1 black silk ligatures on the third postoperative day and by April 27 most of the edema had subsided, the buccal sutures were removed and roentgenograms were taken which revealed the segments in good apposition with maximum bone contact at the cut surface (Fig. 3).

On May 1, the patient was discharged from the hospital. Special feeding instructions and diet were given the patient and she was cautioned about nausea and vomiting and instructed what to do in that event. She was seen daily for oral irrigations until June 4 at which time the intermaxillary ligatures were removed.

The patient was seen again on August 3. There was no movement of the mandibular segments clinically; however, the occlusion could be improved by removing the maxillary appliances which would permit some slight move-

Fig. 4—Postoperative occlusion

ment of the maxillary teeth thus creating better adaptation to the cuspal inclinations of the fixed mandibular teeth. This was done and the patient was permitted to return home.

She was last seen December 28. The orthodontist made some final equilibration adjustments. The occlusion was considered excellent (Fig. 4), and all mandibular excursions could be made without difficulty. No further orthodontic treatment was necessary, and all remaining appliances were removed. The roentgenograms taken at this time showed evidence of bony union. There was considerable improvement in the facial profile (Fig. 5).

COMMENT—There are two variations in this procedure from the usual bilateral ostectomy:

1. A one-stage intraoral approach was utilized.

2. The sectioning was accomplished with the small Stryker bone saw. This method of sectioning has been found to be far more accurate and can be done faster than when burs or a Gigli saw are used. The cut made with the Stryker saw is very thin and the soft tissue when contacted is merely moved in the very short stroke oscillations rather than being cut or traumatized. Only light pressure is needed for most efficient cutting. Too much pressure restricts the blade movements thereby reducing the cutting speed and efficiency. The blades

Fig. 5—View taken eight months postoperatively

come in varying lengths, widths and angles of attachment to the base.

CONCLUSIONS—Despite divergent opinions concerning the various surgical means for the correct treatment of this very common anomaly of the mandible, accurate diagnosis with preoperative and postoperative planning and evaluation are important in the selection of the appropriate surgical method.

The more exactly the objectives are predetermined and the more precisely the procedures are carried out, the closer to perfection will be the final result.

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Department of the Air Force or the Air Service at large.

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■ DENTAL PRACTICE ADMINISTRATION. By Robert K. Stinaff. 271 pages with illustrations and index. $7.50. St. Louis, C. V. Mosby Co., 1960.

The new dental graduate, once he has received his treasured degree, is faced with a multitude of problems. He must decide on whether to enter private practice, and if so, independently or on an association or group practice basis, or enter military service, public health work, teaching, or graduate study.

To arrive at this decision, as well as many more, a knowledge of practice management is essential if a lot of needless mistakes and heartbreak are to be avoided. The field of practice management is little understood and even feared by many recent graduates because, for one reason or another, this course of instruction is omitted from the present-day curriculum of many of our dental schools. Some of the reasons for this, the author feels, are: (1) lack of understanding of the present-day motives of practice administration; (2) an attitude of "watchful waiting"; (3) shortage of qualified and interested teachers, plus the relatively low remuneration for faculty members, and (4) a feeling that the dental schools exist solely for teaching and training the student in the technical aspects of dentistry.

The author does a magnificent job of dissecting this field of dental practice administration and laying it before the practicing dentist, whether he be a recent graduate or an established practitioner of many years' standing. The book follows a regular and logical sequence from making the practice choice and setting the practice goals to planning and equipping the office. All of the various problems of practice administration are discussed and illustrated where necessary for better visualization. The book closes with an excellent chapter on ethics and jurisprudence, as well as one concerned with the problems of a dentist's wife following his death or total incapacity. For additional reading there is an excellent list of 25 references.

Although directed primarily at the dental student and the recent dental graduate, the book will be a welcome addition to the bookshelf of any practitioner interested in increased dental office efficiency and also in learning the fundamentals of the business side of dentistry. —*R. Richard Ray.*

■ ANATOMY FOR STUDENTS IN DENTISTRY. By J. Henderson Scott and Andrew Dixon. 484 pages with 288 illustrations and photographs. Index and reference. $11. Baltimore, The Williams & Wilkins Co., 1960.

The authors have attempted to include material of special interest to students of dentistry. The material is well organized, and includes an introductory chapter on histology. The next 56 pages are devoted to the anatomy of the thorax and abdomen. The remainder of the book is devoted to the head and neck and nervous system. This includes an outstanding chapter on developmental anatomy and one on clinical anatomy.

The illustrations and photographs are numerous and include a great amount of detail.

The book is recommended for the general practitioner of dentistry as a quick reference, and would be a valuable addition to his library. It does not cover the subject of gross anatomy sufficiently to serve as a textbook for students of dentistry. It would be quite satisfactory for dental hygienists or students of nursing.—*David L. Ford.*

■ NITROUS OXIDE IN DENTISTRY: ITS DANGER AND ALTERNATIVES. By J. G. Bourne. $6. Chicago, The Year Book Publishers, Inc., 1960.

Dr. Bourne has written an interesting monograph in which he analyzes the usage of nitrous oxide as the primary agent in ambulatory, outpatient dental anesthesia. The author is the senior consultant anesthetist at St. Thomas's Hospital, London, and as shown by his previous writings, has expressed interest in this subject for several years.

In England and Wales as in many clinics, hospitals and offices in this country unsupplemented nitrous oxide, or nitrous oxide supplemented with trichloroethylene, ethyl chloride or divinyl ether are the agents of choice for general anesthesia.

As is well known, nitrous oxide is one of the least potent of the inhalational anesthetics because of its low volatility. The author points out that anesthesia using this agent is mainly a product of controlled hypoxia. He cites the incidence of fainting or vasovagal syncope under nitrous oxide and the difficulty of recognition due to similarity in the signs of fainting and anesthesia. The patient is supported in the dental chair during the faint and severe cerebral anoxia may ensue. The author mentions that two minutes of cerebral anoxia are critical and may result in permanent neuronal damage.

A poll of 400 dentists in the United Kingdom revealed 500 cases of delayed recovery from anesthesia lasting anywhere from minutes to days or weeks. This, Dr. Bourne deduces, must be the result of a period of cerebral anoxia. The faint may be exacerbated by restriction of oxygen in the anesthetic mixture and he recommends the abandonment of this practice.

Dr. Bourne deals lightly with intravenous barbiturate anesthesia in the monograph, declaring it unsuitable and unsafe for the "occasional anesthetist." In the United States intravenous agents are used much more widely than in Great Britain, perhaps because of more facilities for the training of dental anesthetists. We agree with the author that anesthesia is a full time job and there is no place for the operator-anesthetist.

A technic is presented as an alternative in which the author proposes the use of a cyclopropane, oxygen, nitrogen preset mixture administered with a very simple apparatus. This technic, however, in this reviewer's opinion, would be satisfactory only for the shortest of cases lasting not more than three minutes. Laryngeal spasm and an increased incidence of nausea and vomiting are cited as disadvantages. One cannot help but be concerned about possible cardiac arrhythmias, and the danger of ignition (although the author says this is eliminated). Most certainly electrocautery could not be used in oral surgical procedures. Also the cost of the cyclopropane mixture is not mentioned.

The book is thought provoking and has an extensive bibliography. To the dental anesthetist, the perusal of it is a stimulating experience whether or not one agrees with the methods or opinions of the author.—*David L. Ford.*

■ MEDICINE FOR DENTAL STUDENTS. By R. A. Cawson and R. H. Cutworth. 212 pages with 30 illustrations. Index. $6.50. Boston, Little, Brown & Co., 1960.

The authors state in the preface that the general purpose of this text, "is to give a general picture of the more important aspects of medicine in as much detail as the dental student can manage during the time available to him." It appears that the authors have accomplished this purpose, although discussion in many areas is quite brief.

The text is divided into 13 chapters. The subjects covered are outlined in a very readable form. The more common and some of the less common medical diseases are covered.

As an outline of general medicine for quick and ready reference, *Medicine for Dental Students* accomplishes its end; although, if more thorough discussion of various disease entities is desired, reference must be made to one of the more standard textbooks of medicine.—*Paul H. Mathews.*

■ HENRY E. SIGERIST ON THE HISTORY OF MEDICINE. Edited by Felix Marti-Ibañez, M.D. 316 pages. Foreword, introduction, index. $6.75. New York, MD Publications, 1960.
HENRY E. SIGERIST ON THE SOCIOLOGY OF MEDICINE. Edited by Milton I. Roemer, M.D. 400 pages. Foreword, preface, index. $6.75. New York, MD Publications, 1960.

The 58 essays in these two volumes, selected from the writings of Henry E. Sigerist, demonstrate why this scholar is generally considered to be the greatest medical historian of our time. The author's untimely death in Switzerland in 1957, at the age of 65 years, came when he had completed only two volumes of a projected eight-volume *History of Medicine* and before he had begun his planned four-volume *Sociology of Medicine*.

After serving as professor of the history of medicine at the University of Leipzig, Sigerist came to Johns Hopkins in 1932 as director of the Institute of the History of Medicine. In his 15 years as director, he trained a generation of medical historians, and lifted medical historiography to a high plane, infusing it with a sociological content and relating it to the culture, art, creeds, economy and technology of each period.

Most of the 27 essays in the volume *On the History of Medicine* were selected by the author at the request of the editor. The essays deal with medical history, ancient and medieval medicine, medicine during the Renaissance and the Age of Enlightenment, and personal history. Even readers who shy at Sigerist's advocacy of socialized medicine will delight in the ease of his style, the immense breadth of his learning and his personal wit and charm. Of particular interest in this volume are the essays "The Social History of Medicine," "American Spas in Historical Perspective," "On Hippocrates," "Medieval Medicine," "Paracelsus in the Light of Four Hundred Years," "Boerhaave's Influence upon American Medicine," and "Thoughts on the Physician's Writing and Reading."

Many of the 31 essays (three of which were hitherto unpublished) in the volume *On the Sociology of Medicine* deal with social aspects of medicine in the United States, Europe, Russia, South Africa and India. Others treat of a variety of topics relating to health service. Among the outstanding essays are "The Physician and His Environment," "The Special Position of the Sick," "An Introduction to the Economics of Medicine," "The Place of the Physician in Modern Society," "Socialized Medicine Abroad," and "The History of Medical Licensure." The essay "Developments and Trends in Dentistry" traces the background of dentistry and presents possible reasons for the emergence of dentistry as a separate profession. Sigerist's modesty and his power as a historian both are evident in this essay. The volume closes with the stimulating address, "What Medicine Has Contributed to the Progress of Civilization."

The publisher is to be congratulated on collecting the essays and issuing these two volumes. The books are attractively bound, and the type size and format contribute to readability.—*N. C. Hudson.*

■ TRAUMATISMES ACCIDENTELS EN STOMATOLOGIE—MASSIF FACIAL ET INCISIVES SUPERIEURS. 292 pages with illustrations. Paris, France, Masson et Cie, 1959.

This volume contains the essays presented by Maronneaud, Peri, Crépy, Lachard, Grazide, Bouyssou, Clauzade and Peyre at the XVIth Congrès de Stomatologie held in Paris, October 5-10, 1959. It is divided in two parts: (1) traumatic lesions of the upper part of the face caused by automobile accidents, and (2) accidental traumatism of the upper incisors. The book contains many drawings, graphs, photographs, microphotographs and a very elaborate bibliography.

The volume is concerned with traumatism of the bones of the superior part of the face and lesions of the soft tissues and the sensory organs in relation with these structures, and fractures, contusions, luxations, subluxations, cracking of the upper incisor teeth—deciduous and permanent, and traumatism affecting tooth buds and soft tissues (periodontal membrane, gingiva).

Discussion of bone and teeth fractures is presented in the following sequence; causes, mechanism, clinical and anatomic features, associated lesions, clinical and roentgenographic diagnosis, emergency treatment, secondary treatment, complications, sequelae and their treatment and results.

All these reports together form a unit and cover clearly and fully the subject of fractures of bones of the face and of the incisor teeth; they synthesize the methods of examination and treatment. They are written clearly and simply. Their value resides in their exact limitation and their completeness. Because of their anatomical review, they are especially written for dental students who wish to learn about the subject. The book also is of great interest to the practitioners familiar with the treatment of fractures and to those—and there are many—who come across cases of fractures of incisors; the book furnishes practical information regarding diagnosis and treatment.—*Gerard de Montigny.*

■ Bone Homografts in the Surgical Treatment of Cysts of the Jaws and Periodontal Pockets. By Heyman Krømer. 120 pages with 65 illustrations and 32 tables. Oslo, Oslo University Press, 1960.

This monograph is a report of a clinical and experimental study of intraoral homogenous bone grafts in defects remaining after enucleation of central cysts of the maxilla and mandible. This project, begun by the author in 1952, also estimates the value of homografts in the treatment of infrabony periodontal pockets.

Since results obtained by conventional methods of cystectomy or cystotomy have not proved to be entirely satisfactory in the past, a discussion of this kind is both timely and stimulating to the oral surgeon, periodontist, and endodontist alike. Statistical studies have shown that methods used heretofore in the treatment of such defects have resulted in a surprisingly high number of unfavorable results.

Homogenous, cancellous bone chips stored in merthiolate have been used by the author to pack the defect. He describes his technic in which operative procedure is reviewed in detail. This type of bone is resistant to infection and is well tolerated by the host tissues. In the treatment of both cystic defects and periodontal pockets the author enjoyed a high percentage of success according to his statistics.

Large charts are included which summarize the data gathered in each clinical case and the monograph is embellished with photographs, illustrations and photomicrographs of excellent quality and reproduction.

The author's style is concise and the reader's interest is held throughout. Summaries of the experiments are given in English, German and Norwegian. The book makes a rewarding evening's reading and is a worthwhile experience for all dentists interested in the subject.—*David L. Ford.*

■ Temporomandibular Joint Disease. By Welden E. Bell. 226 pages with 113 illustrations. Dallas, The Egan Co., 1960.

This book is planned by the author to be a teaching manual for the dental profession. It is well organized and begins with a chapter on functional anatomy followed by a detailed description of a normal joint. This chapter should be particularly useful to the dental practitioner. The next four chapters deal with the etiology of joint disease and include a comprehensive review of a group of 32 representative case histories. The technic of mandibular joint examination is presented in detail. The concluding chapter deals with the broad principles of therapy. Specific details of treatment are avoided, but the author clearly portrays the need for various types of therapy, depending on the joint problem that is present.

Temporomandibular Joint Disease should be a valuable addition to the dental practitioner's library, and should be particularly helpful in clearing up some of the confusion which exists concerning terminology, etiology and therapy.—*James B. Edwards,*

■ ATLAS OF CLINICAL PATHOLOGY OF THE ORAL MUCOUS MEMBRANE. By Balint J. Orban, M.D., and Frank N. Wentz, M.S., Ph.D. Second edition. 148 pages with 234 illustrations. Index. $14.50. St. Louis, C. V. Mosby Co., 1960.

The warm reception accorded the first edition of this text encouraged the authors to produce a second edition. It is obvious that extensive consideration was given to improvements and corrections of deficiencies inherent in the first edition. Although the over-all presentation of the material follows the same basic outlines, certain refinements are outstanding. Changes in printing and page design add a large measure of esthetics and clarity. The photomicrographs reproduced in both editions are excellent, and to these are added two studies in special stain technic which appear in color.

The clinical photographs presented in the first edition left much to be desired for accuracy of interpretation because of poor representation of color value and the sacrifice of detail for close-up reproduction. Although the vast majority of these appear in the second edition and in unaltered form, numerous additional photographs with excellent clarity and color value supplement the text.

In the five years which intervened between editions, the authors properly have included two new clinical disease entities, as well as some rather recent additions to the therapeutic armamentarium. The second edition should prove to be a useful partner to the general practitioner in the chair-side diagnosis of lesions of the soft tissues of the oral cavity and in up-to-date therapeutics. The specialists concerned daily with these problems may find an occasional review of this volume a pleasurable and stimulating experience.—*Edward P. Henefer.*

■ FEDERAL AGENCIES FINANCING RESEARCH. By Social Legislation Information Service, Washington 6, D. C., 1959.

The Social Legislation Information Service, a nonprofit organization, reports impartially on social legislation. This pamphlet describes in detail the types of research sponsored by federal agencies at the present time and the technics involved in applying for research funds. I assume that this pamphlet will be revised periodically to keep it up to date.

The pamphlet would serve to introduce members of the profession who are unfamiliar with federal financing to the various agencies supporting all types of dental research.

The pamphlet may be obtained from: Social Legislation Information Service, Inc., 1346 Connecticut Avenue, N.W., Washington 6, D. C.—*William F. Via, Jr.*

■ A New Treatment of Ameloblastomas (Preliminary Report). Louis W. Schultz, M.D., D.D.S., and Sunder J. Vazirani, D.D.S. Am. J. Surg. 98:839 Dec. 1959.

This article illustrates the problems encountered in the clinical management of recurrent ameloblastoma and reports preliminary findings on a new method of treatment of the afore-mentioned neoplasm. The procedure has recently been reported and reintroduced of induced regression of neoplasms by the controlled limitation of vascular supply. With this method in mind, the thought was entertained of using sclerosing solutions not only to produce ischemia in the entire region including the tumor but also to produce fibrogenesis around the tumor, thereby controlling the mechanism of spread of the neoplasm.

It was decided to begin a clinical trial and inject a sclerosing agent (Sylnasol) into an inoperable recurrent case of ameloblastoma. The patient received eight injection treatments, the dose being 10 to 15 cc. over a 12 month period. The following clinical observations were noted: (1) complete fibrosis around the tumor mass; (2) no evidence of ameloblastoma of the tissue noted in the tumor; (3) considerable regression in size, and (4) no evidence of spread of the neoplasm. Blocking of the local or systemic spread of the neoplastic cells may facilitate surgical procedures and prevent systemic metastasis. It is suggested that this interesting effect should be studied on a larger number of patients over an extended period of time, for not many patients have been treated by this method nor has there been a sufficient time lapse to draw positive conclusions. This is a preliminary report and the clinical aim is supported by three instances of ameloblastomas. Further research in the clinical application is under way. It is suggested that injection of Sylnasol may be made every other week. The dose is 10 to 15 cc. and 6 to 10 injections are needed to treat a neoplasm, depending on the size of the tumor.—*Myron Kaufman.*

■ Tetanus-like Reaction to Prochlorperazine (Compazine). Ignacius Scime, M.D., and Edward Tallant, M.D. J.A.M.A. 171:1813 Nov. 1959.

Eight patients, while receiving small daily doses of prochlorperazine (Compazine), developed an extrapyramidal type of motility disturbances. These reactions consisted of spasms of the masseter muscles; protrusion, loss of control, numbness, and athetoid movements of the tongue; tonic contractions of the sternocleidomastoid and trapezius muscles; gross tremors; oculogyric crises; tonic spasms of the back muscles with opisthotonos, and mask-like facies. The duration of these reactions varied from 30 minutes to 48 hours. No permanent after-effects developed. The therapy administered with apparent success consisted of discontinuance of prochlorperazine and all phenothiazine derivatives. For mild reactions small doses of phenobarbital were given. For severe reactions 0.25 Gm. of amobarbital sodium was given slowly intravenously until the reaction subsided.—*Irwin A. Small.*

■ Malignant Tumors of the Upper Jaw. Alfred M. Markowitz. Surgery. 47:443 March 1960.

The results of treatment of patients with malignant tumors of the maxilla in the Columbia Presbyterian Medical Center during the past

18 years form the basis of this report. The paper deals primarily with malignant epithelial tumors arising in the maxillary sinus. Excluded are tumors originating from the palatal mucosa of the maxilla since these should be studied properly as a part of a group of oral cavity carcinomas. The historical aspects of malignant maxillary tumors in various methods of therapy are reviewed. Sixty-eight patients with malignant tumors of the maxilla are studied in terms of pathology, therapy, and long-term cures. In the present series there were 56 patients with epithelial tumors of the maxilla. The five year cure rate was 14 per cent. With the improvements in anesthesia and the availability of blood and antibiotics, the surgical attack on carcinoma of the maxilla has become bolder yet this has not reflected itself in improvement in the five-year survival rate. This study presents statistical findings that indicate that the results obtained by conventional surgery and radiotherapy do not achieve the long-term cure rates obtained 25 years ago by using electrocautery and radiotherapy. The authors believe that there is sufficient evidence to suggest that further experience should be obtained in this country in the therapeutic measures outlined by Larson and Martensson (using electrocautery technic and radiotherapy) in an attempt to raise our low long-term survival rates.—*Myron Kaufman.*

■ Technical Clarification of the Bone-Flap Method in Surgery for Cleft Palate. Sidney K. Wynn, M.D. Am. J. Surg. 98:811 Dec. 1959.

The bone-flap method in surgical treatment of cleft palate may be used as early as the ninth month in infants of normal development. Surgery on the palate should be performed so that complete closure can be obtained before the child learns to speak. This will help avoid the acquisition of poor speech habits during the early formative period. Narrowing of the width of the palate is not secondary to early surgery on the palate if the bone flap technic is used. A series of diagrams is presented for clarification of the technic employed and the surgical technic is explained in detail. This technic provides a simple, relatively safe procedure for reconstruction of the cleft palate. A new bony vault is restored to the roof of the mouth as nature originally intended. The results in the speech of the child are superior to those of other methods.—*Myron Kaufman.*

■ Acute Postoperative Parotitis (Surgical Mumps). Adolph W. Schwartz, M.D., Kenneth D. Devine, M.D., and Oliver H. Beahrs, M.D. Plast. & Reconstr. Surg. 25:51 Jan. 1960.

The more recent concept of the etiology of secondary parotitis is that the infection originates in the mouth and reaches the parotid gland by way of Stensen's duct, although blood-borne or lymph-borne emboli may be the causative agent in certain instances. Postoperative parotitis is encountered more frequently among generally debilitated patients suffering from dehydration, depression of salivary secretion, vomiting, and mouth breathing. Dry mouth is one of the main predisposing factors. It is mostly the result of dehydration of the body and lack of a physiologic stimulus of salivation (frequently supplemented by the use of sympathomimetic drugs). Stagnation of salivary flow leads to infection.

The organisms responsible for infection are, in descending order of frequency, *Staphylococcus pyogenes, Streptococcus viridans,* and *Pneumococcus.* Owing to the lobulated structure of the gland, the multiple septums prevent an early confluence of small necrotic foci and lead to the formation of multiple abscesses.

The disease usually is reported to occur in one of every 1,000 to 2,000 patients who undergo major surgical procedures. Most authors agree that women are more frequently affected than men. All age groups are represented.

The first symptoms in the parotid region occur between the second and twentieth postoperative day, usually between the second and the fifth.

The clinical picture of postoperative paro-

titis is that of acute inflammation. The swelling appears first in front of the ear lobe, and then spreads to the entire gland. The onset usually is rapid. As the swelling enlarges, the patient may complain of a throbbing pain. The temperature rises to 102° to 104° F. and is accompanied by headache, malaise, and leukocytosis. The opening to Stensen's duct is swollen and red, and usually purulent material is readily expressed by gentle pressure along the duct. There is always a history of a preceding operation, extensive trauma, or a prolonged illness.

Symptomatic treatment is utilized, including a bland diet, ointment to affected skin and lip, cold or warm compresses, increased oral or parenteral intake of fluid, analgesics, antipyretics, and a laxative.

Since most of the pathogenic organisms found in the purulent fluid in Stensen's duct will prove to be sensitive to penicillin, massive doses of this antibiotic should be started early, without waiting for reports on the cultures and the sensitivity studies. Lugol's solution has been advised on the basis that iodine has an antiseptic value while being excreted from the salivary gland.

Mechanical sanitation by fluid irrigation plays an important role in the prevention as well as the treatment of parotitis. A note of warning should be issued concerning probing and dilatation. Occasionally more harm than benefit is achieved, particularly since the tissues are even more friable than normal because of the presence of infection.

Radiotherapy was first introduced by Rankin and Palmer. These authors concluded that irradiation, if applied immediately on recognition of the infection, tends to avoid suppuration and decreases mortality. Radiotherapy is included in the treatment of secondary parotitis as a standard measure. It has been used less frequently since development of the numerous antibacterial drugs.

Surgical intervention is required only in the presence of an abscess. Incision of the parotid abscess is indicated in comparatively rare instances. Stab incision is definitely contraindicated because of the large number of important structures that are likely to be cut. The resultant salivary fistula usually closes spontaneously in 2 weeks to 2 months.

Since the introduction of x-ray irradiation as the method of treatment, mortality rates of 20 and 16 per cent have been recorded as opposed to rates as high as 50 per cent in 1930. Still too frequently in statistical evaluations, the death of a patient with postoperative parotitis is attributed incorrectly to this complication.

In a series of 83 patients seen in a recent 14 year period at the Mayo Clinic, it was found that the incidence of postoperative parotitis has been greatly reduced. This is attributed chiefly to improved knowledge of modern medicine in surgery.—*Donald B. Rae.*

■ MANDIBULOFACIAL DYSOSTOSIS. James Stovin, James Lyon and Raymond Clemmens. Radiology. 74:225 Feb. 1960.

Mandibulofacial dysostosis is a congenital syndrome which has been recognized in increasing numbers in the past two decades. This syndrome of congenital anomalies involving the mandible, maxilla and ears, was first noted by Barry in 1899. Since then 59 instances have been reported in the English and European literature. Treacher Collins reported two instances in 1900 and since then his name has been associated with this syndrome.

Much stress is placed on the hereditary component of this syndrome. Congenital defects associated with the syndrome are multiple. The most common observation is an obliquely downward slanting of the palpebral fissures giving an "anti-mongoloid" appearance to the eyes. There is notching of the lower lids (coloboma) at the junction of the middle and outer thirds. Hypoplasia of the facial bones is a constant finding. The malar bones are hypoplastic or entirely absent. The zygomatic arches are incomplete and the infraorbital ridges are defective and depressed. Microtia and defects of the auricles, stenosis or absence of the external auditory canals, middle ear abnormalities, inner ear defects and deafness are all mentioned as part of the syndrome. A receding hypoplastic mandible is reported in all but

four of the instances. In addition to being hypoplastic, the angle of the mandible is more obtuse than usual. Malocclusion and associated dental problems result from the micrognathia. Facial or abnormal growth of hair extending forward along the cheeks and associated blind fistula to the skin have been reported, as has macrostomia with a highly arched palate or cleft palate. Other inconsistent congenital findings associated with the syndrome are listed. Two case histories are described.—*Irwin A. Small.*

■ First Day Removal of Skin Sutures. John A. Sakson, M.D. A.M.A. Arch. Surg. 78:304 Feb. 1959.

Two hundred operations of various types were performed in which all sutures or clips were removed within the first 24 postoperative hours. Two hundred similar cases were selected to act as controls. All incisions in the treated group healed promptly and with fewer complications than did those in the controlled or untreated group. Patients had less wound discomfort without sutures or clips in place than those treated by the usual methods. No skin infection was found in any of the treated patients. Cosmetically the appearance of the skin was superior to that in instances repaired by the usual method. Butterfly adhesive dressings were sufficient to keep the wound edges in apposition during the entire postoperative period. Removal of sutures and clips in the early postoperative period is considered to be a definite all-around improvement over the usual method of allowing them to remain in place for longer periods.—*Myron Kaufman.*

■ The Tolerance of the Temporomandibular Joint to Fracture, Dislocation and Associated Injury. N. J. Wilde. Plast. & Reconstr. Surg. 25:574 June 1960.

The aim of treatment of fractures of the temporomandibular joint, as with any fracture of the mandible, is restoration of occlusion, mastication, excursion, and appearance. The principles of treatment which will accomplish these ends with the least complications in the most instances are those which are followed. Treatment falls into two classifications, open and closed. The author proposes to make a case for the principle of closed reduction. A detailed analysis of the literature is presented discussing the advantages and disadvantages of each type of approach. Analysis of the literature shows that complications are based on very few instances whereas a review of over 300 instances of closed reduction of the temporomandibular joint fracture does not bear out the incidence of complications. The author's technic of closed reduction to eliminate complications is presented. A discussion of 47 instances of temporomandibular joint fracture treated, with the exception of one, by closed reduction is discussed. A series of ten instances is illustrated as representative of the 46 in this series. It is emphasized that the establishment of occlusion is essential to eliminate complications such as open bite and to obtain adequate mandibular excursion.—*Myron Kaufman.*

■ The Development of Cleft Palate Resulting from Maternal Pteroylglutamic (Folic) Acid Deficiency During the Latter Half of Gestation in Rats. C. W. Asling, M. M. Nelson, H. D. Dougherty, H. V. Wright and H. M. Evans. Surg., Gynec. & Obst. 111:19 July 1960.

The development of cleft palate resulting from the maternal deficiency of pteroylglutamic acid during the latter part of gestation has been studied and compared with normal palatal development in rats of the Long-Evans strain. When the deficiency was instituted on the eleventh day of gestation, 95 per cent of the young at term had cleft palates. The incidence rose to 100 per cent when the deficiency was instituted one day earlier, but was negligible when the deficiency started on the twelfth day and thereafter.

Micrognathia in varying degree was frequent in accompanying the deformity. Development of the lower jaw in P.G.A.-deficient

fetuses was retarded from the fourteenth or fifteenth day of gestation. In the particular sequence of conditions encountered in this experiment it could be held that the small size and abnormal shape of the mandible were responsible for the failure of the tongue to descend and to permit normal position and fusion of the lateral palatine processes.—*Irwin A. Small.*

■ OSTEECTOMY OF THE MANDIBLE AND CLEFT LIP AND PALATE REHABILITATION. Reed O. Dingman. Plast. & Reconstr. Surg. 25:213 March 1960.

Accentuation of minimal defects in the repaired cleft lip and cleft palate child by subsequent growth and developmental changes may culminate in less acceptable results in the young adult patient. Mandibular surgery often is not a part of the reconstructive program although the deformity of the mandible may be a glaring part of the total deformity. Operations on the mandible of patients with severe maxillary-mandibular malrelation offer improvement not possible of attainment by orthodontic, prosthetic, or other means. A patient with underdevelopment of the middle third of the face and a normal mandible may give the appearance of having a prognathic jaw. Osteectomy of the mandible may be helpful in such instances.

Fourteen years of experience with a large number of patients has substantiated the opinion that the over-all results of the operation on the body of the bone are superior to those done through the ramus of the mandible. Ninety-five patients have been treated by this method. The optimal occlusion, site of osteectomy, and amount of bone to remove, are determined preoperatively in cooperation with the orthodontist, who also must assume responsibility for adequate fixation appliances. Precise patterns are cut from thin sterilizable copper or aluminum and adequately marked in order to facilitate the problem of cutting bone segments with accuracy. The first molar is usually selected for extraction and the osteectomy site. If there is an edentulous area in the second bicuspid or second molar region, it may be used rather than to sacrifice a functional tooth. The surgical procedure is now done in one stage after thoroughly preparing the mouth by adequate oral hygiene. Complications of malunion or nonunion may develop in the patient who is edentulous in the molar area. Even the securely wired mandible may be pulled out of position by the strong forces of the muscles of mastication if posterior teeth or a suitable splint are not present to stabilize the proximal segment. Modification of the osteectomy by means of a step created at the inferior border will stabilize the proximal segments of the mandible and is desirable in patients with missing posterior teeth. The step on the proximal segment should provide at least 1 cm. of horizontal contact with the anterior segment of bone.—*Irwin A. Small.*

■ NEUROSURGICAL PROCEDURES FOR THE CONTROL OF INTRACTABLE PAIN IN MALIGNANCIES OF THE HEAD AND NECK. Nicholas Wetzel, M.D. Am. J. Surg. 98:800 Dec. 1959.

Many patients with malignant growths of the head and neck survive for long periods of time, even though their disease has not been controlled by surgical and irradiation therapy. Many of these unfortunate people have severe pain, and this symptom may date either from the onset of the disease or from the first sign of its recurrence. Pain-relieving operations provide the best results when performed early, certainly before the patient has received any quantity of narcotics; that is, somewhere between the aspirin and codeine stage.

The neurologic surgeon can make a real contribution to the care of these patients. If the patient's pain is in the face and throat, sectioning of the trigeminal nerve, the glossopharyngeal nerve, and part of the vagus nerve, as well as the nervus intermedius, may be sufficient. However, if pain in the neck is also present, sectioning of the cervical roots also should be performed. Sectioning of the nervus intermedius may be quite important for the relief of deep facial pain, but it is difficult

sometimes to define this nerve and sometimes sectioning is impossible. Pain deep in the ear is said to be particularly difficult to relieve and may be due to the impulses passing through the nervus intermedius. All of the afore-mentioned nerves may be sectioned at a single operation under local anesthesia alone. There does not seem to be any disabling loss of neurologic function after sectioning of these nerves. Even sectioning of the ninth and tenth cranial nerves does not cause difficulties in swallowing, and sectioning of the ninth nerve bilaterally does not cause overwhelming difficulties. The series of 17 cases reported on is not large but there is little in the current literature to suggest a widespread use of these procedures, and it is therefore felt to be justified in presenting this experience since the newer drugs and other operations have not solved the problem.—*Myron Kaufman.*

■ THE PREVENTION AND TREATMENT OF HEARING LOSS IN A CLEFT PALATE CHILD. F. W. Masters, H. G. Bingham and D. W. Robinson. Plast. & Reconstr. Surg. 25:503 May 1960.

Audiometrically detectable hearing loss secondary to congenital clefts of the palate is an important and as yet unanswered problem. The former goals of cleft palate therapy, in particular normal speech and normal facial growth, must be enlarged to include normal hearing if the rehabilitation program for children with congenital clefts is to be adequate.

The high incidence of hearing loss in the child with cleft palate appears to depend on the type of palatal defect, the method of repair, and the age at which repair is performed. The lowest incidence of conduction deafness occurred in those children who underwent surgical repair which included closure and lengthening of the soft tissue of the palate before the age of 18 months. The highest incidence of hearing loss occurred in prosthetically repaired clefts, as a result not only of the inability of the prosthodontist to produce an adequate prosthesis prior to the age of 24 months, but also to the failure of a prosthesis to restore the dynamic function of the palatal musculature.

The chronic recurring middle ear infection with its subsequent audiometrically detectable hearing deficit is a manifestation of altered eustachian physiology. In the child with cleft palate this is almost inevitable as the extrinsic musculature of the eustachian apparatus is not intact. Thus, early restoration of the dynamic physiology of the eustachian apparatus by creation of a normal muscular insertion appears to be the best method available to reduce the appalling incidence of hearing loss.—*Myron Kaufman.*

■ MALIGNANT TUMORS OF THE HEAD AND NECK. Martin Swerdlow, M.D. Am. J. Surg. 98:858 Dec. 1959.

The head and neck is a complex region with a wide variety of organs and tissues. This discussion is limited to three general zones: (1) the mouth, including the lip, cheeks, gums, floor of mouth, palate, tongue, tonsils, and oropharynx; (2) the nose, including the nasal cavity, paranasal sinuses and nasopharynx, and (3) the neck, including the larynx, salivary glands, thyroid, and lymph nodes. The discussion is limited mainly, but not exclusively, to the malignant epithelial tumors of these organs and tissues. The incidence, clinical and microscopic appearances and cure rates are discussed for lesions in each region. The predominant malignancy of the mouth region is the squamous cell carcinoma, well differentiated anteriorly toward the lips and poorly differentiated posteriorly. In the nasal region, the transitional cell carcinoma often shows features of squamous cell carcinoma. In the neck zone, the salivary glands exhibit adenocarcinoma of the adenoid cystic variety, and the lymph nodes, metastatic carcinoma and lymphosarcoma.—*Myron Kaufman.*

Announcements

■ Karl S. Klicka Named Trustee of the Educational Foundation

Karl S. Klicka, director of the Hospital Planning Council for Metropolitan Chicago, has been named a trustee of the Educational Foundation of the American Society of Oral Surgeons. Dr. Klicka, a graduate of Western Reserve University School of Medicine, received his Master's Degree in hospital administration at the University of Chicago. He is a member of the American Hospital Association, the American College of Hospital Administrators, and a Fellow of the American Medical Association.

■ Research and Teaching Traineeships at the University of Pennsylvania

Research and teaching traineeships in the basic sciences, in periodontology and in the comprehensive treatment and rehabilitation of the cleft palate patient are available at the School of Dentistry, University of Pennsylvania.

The traineeship in periodontology is a two year program devoted to basic science studies, clinical practice and research. It is intended primarily for those individuals who wish to enter into teaching and research in periodontology. The traineeship in the comprehensive treatment and rehabilitation of the cleft palate patient is clinically oriented; however, opportunities for coursework in fields related to cleft palate therapy are available.

All traineeships are supported by the United States Public Health Service. Annual stipends vary from $4,500 and up depending on the qualifications and needs of the successful candidates. Inquiries concerning the basic science and cleft palate traineeships should be sent to the chairman, Committee on Traineeships and Fellowships, University of Pennsylvania, School of Dentistry, 4001 Spruce St., Philadelphia 4. Inquiries concerning the traineeships in periodontology should be sent to the dean, Graduate School of Medicine, 237 Medical Laboratories, University of Pennsylvania, Philadelphia 4.

■ Postgraduate General Anesthesia Course at Georgetown

A concentrated one week course in general anesthesia for the office practice of oral surgery using the barbiturates as the principal drugs will be offered by the School of Dentistry, Georgetown University, March 7-11.

Candidates must have two years' experience with general anesthesia on ambulatory patients, or three months' or more experience in an anesthesia training program in an approved hospital and they must have membership in the American Society of Oral Surgeons or a component society.

The class is limited to 15 and the fee is $250. Further information can be obtained from the registrar of the school at 3900 Reservoir Rd., N.W., Washington 7, D. C.

■ Bruce Douglas to Stay a Second Year in Japan

Sakae Murakami, dean of Okayama (Japan) University Medical School, has announced that Bruce L. Douglas has been awarded a second-year Fulbright grant for oral surgery instruction. Dr. Douglas lives in Rego Park, N. Y.

■ Academic Lecture Program at Mount Sinai Hospital, New York

The academic lecture program by the department of dental and oral surgery of The Mount Sinai Hospital of New York City includes courses of instruction to be delivered by members of the staff in all phases of oral surgery, oral medicine and applied pharmacology, as well as prosthodontics (including cleft palate and maxillofacial prosthetics), endodontics, periodontology, children's dentistry and anesthesiology.

Members of the dental profession are welcome and a complete curriculum and time schedule is available to those who are interested. Information can be obtained by writing to A. Norman Cranin, department of dental and oral surgery, The Mount Sinai Hospital, 100th St. and Madison Ave., New York 29.

■ The American Institute of Oral Biology Case History Service

The Institute continues to offer case histories from the broad field of oral biology for the year 1960-61 (through September 30). These include original 35 mm. color slides of pathologic conditions of the oral cavity and jaws, accompanied by pertinent laboratory findings, medical background, roentgenograms, photomicrographs, diagnostic criteria and whatever else may be indicated in each individual instance, with a general discussion of the disease. A loose-leaf binder and matching slide box will be furnished.

The subscriber to this case history service is entitled to full membership in the American Institute of Oral Biology. Members of the American Dental Association or the American Medical Association, or their foreign equivalents, are eligible to apply.

Further information can be obtained by writing to the secretary, Mrs. C. Novembri, 2240 Channing Way, Berkeley 4, Calif.

■ Graduate Study Programs at the University of Pittsburgh

Applications are now being accepted by the graduate division of the University of Pittsburgh School of Dentistry for graduate study in the fields of anesthesiology, oral surgery, orthodontics, periodontics and prosthodontics leading to the Master of Science degree. Selection of students for the fall session of 1961 will be made in March.

A non-degree course, full time for 12 months, in general anesthesia is available for qualified dental graduates.

Graduate study in the preclinical basic sciences of anatomy, biochemistry, microbiology, pathology, pharmacology and physiology leading to the Master of Science or Doctor of Philosophy

degree also is offered through the Schools of the Health Professions. Successful applicants in this latter program are eligible for financial assistance in the form of traineeships.

Application forms and further information can be obtained by writing to the director of graduate education at the school at Pittsburgh 13.

■ University of Pennsylvania Offers Postgraduate Courses

Two courses of interest to oral surgeons are being offered by the division of postgraduate courses in the University of Pennsylvania School of Dentistry. The address is 4001 Spruce St., Philadelphia 4. They are: impacted teeth, January 25-27, Victor H. Frank and associates, and applied anatomy, February 22-24, Harry Sicher, M.D.

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What makes Pentothal a lively subject of interest to the oral surgeon?

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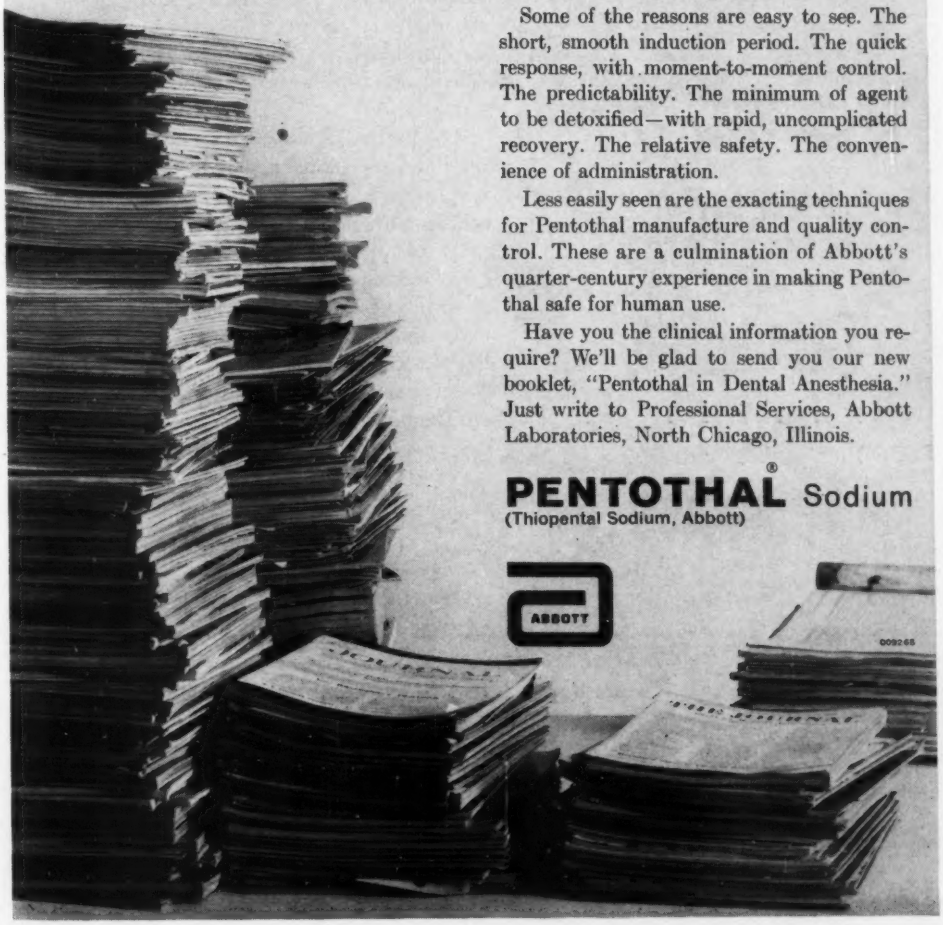

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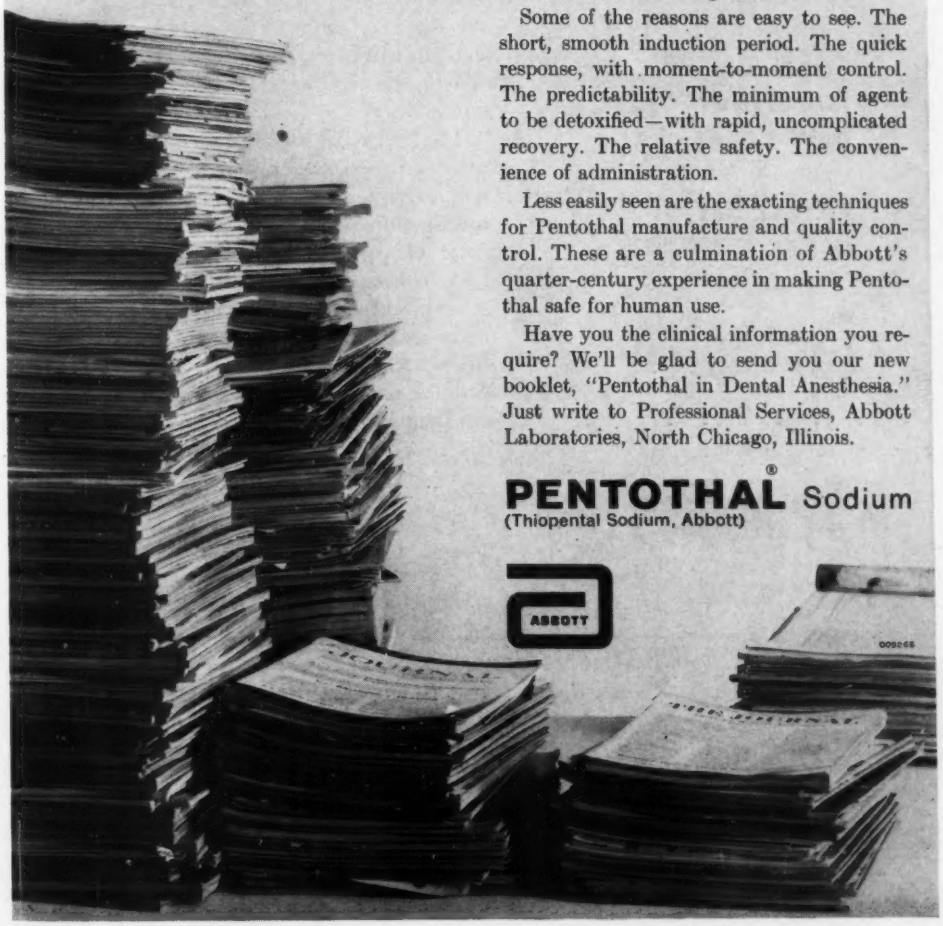

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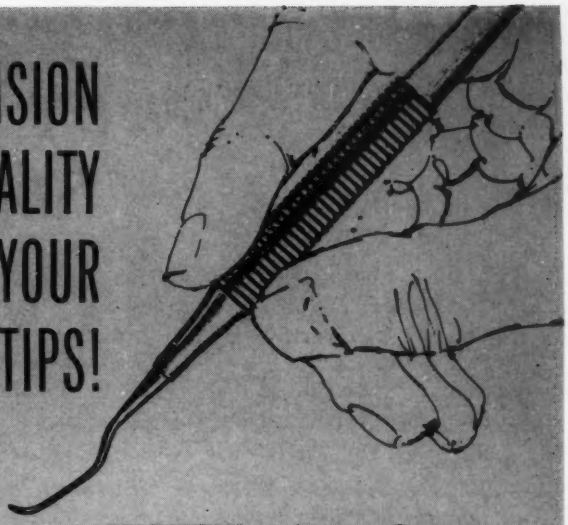

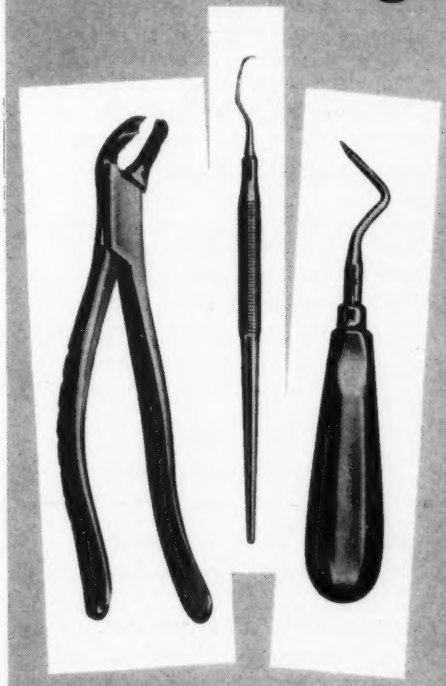

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